APPENDIX E

URS Greiner Field Sampling

CONTENTS

CONTENTS (Continued)

Field Sampling Plan Alterations for
FSPA Nos. 1, 2, and 3

FIELD SAMPLE PLAN ALTERATIONS
FOR THE
BUNKER HILL FACILITY/COEUR D'ALENE BASIN PROJECT
SHOSHONE COUNTY, IDAHO

Prepared for:

United States Environmental Protection Agency
Work Assignment No. 54-20-02QC
Contract No. 68-W9-0054 / 0031
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

February 1998

Prepared by:

URS Greiner
2401 Fourth Avenue, Suite 1000
Seattle, Washington 98121

and

CH2M Hill
777 108th Avenue NE
Bellevue, Washington 98009

URSG DCN 4162500.0970.05.b

Project Name:	Bunker Hill Facility/Coeur d'Alene Basin
Contract No.:	68-W9-0054
Work Assignment No.:	54-20-02QC
URSG Document Control No.:	4162500.0970.05.b

APPROVAL FORM

Prepared for:

United States Environmental
Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Prepared by:

URS Greiner
2401 Fourth Avenue, Suite 1000
Seattle, Washington 98121

CH2M Hill
777 108th Avenue NE
Bellevue, Washington 98009

Approved by:

Signature: _____ **Date:**_____
Name: Michael Rosenfeld
Title: URS Greiner, Project Manager

Signature: _____ **Date:**_____
Name: Libby Goldstein
Title: URS Greiner, Quality Assurance Manager

Signature: _____ **Date:**_____
Name: Mary Jane Nearman
Title: U.S. EPA, Work Assignment Manager

Signature: _____ **Date:**_____
Name: Bruce Woods
Title: U.S. EPA, Quality Assurance Officer

Signature: _____ **Date:**_____
Name: Melody Walker
Title: U.S. EPA, Regional Sample Coordinator

CONTENTS

CONTENTS (Continued)

ACRONYMS

bgs	below ground surface
BHFP	Bunker Hill Facility Project
°C	degrees Celcius
CLPAS	Contract Laboratory Program Analytical Service
COC	chain-of-custody
CSO	Customer Service Office
D	depth
DQO	data quality objectives
DTW	depth to water
EPA	U.S. Environmental Protection Agency
FSD	field sample data
FSP	field sample plan
HASP	Health and Safety Plan
ID	inside diameter
IDW	investigative-derived waste
L	length
QAPP	quality assurance project plan
RI/FS	remedial investigation/feasibility study
RSC	Regional Sample Coordinator
TD	total depth of well
TSOP	Technical Standard Operating Procedures
URSG	URS Greiner, Inc.
USGS	U.S. Geological Survey
V	volume
W	width

Sediment Coring in the Lower Coeur d'Alene River Basin, Including the Lateral Lakes and River Floodplains

1. SUMMARY

Changes to the field sampling plan detailing the *Sediment Coring in the Lower Coeur d'Alene River Basin, Including the Lateral Lakes and River Floodplains* (Addenda 01, dated October 22, 1997) are documented in this section. Sediment coring and sampling activities were conducted during November and December, 1997. Field changes are summarized in the following sections dealing specifically with the survey and sampling efforts.

2. GEOPHYSICAL/BATHYMETRIC SURVEY

Original plan: Conduct three geophysical/bathymetric surveys: (1) along six transects (Cataldo, Dudley, Killarney, Medimont, Swan, and Harrison) on the main stem of the Coeur d'Alene River (CDR), (2) within four lakes (Cave, Medicine, Killarney, and Rose Lakes), and (3) along one floodplain transect.

Alteration: Field changes to the surveys are summarized below:

Lakes - The acoustic data revealed that the lake sediments were gas charged and that the acoustic reflection systems would not be able to achieve significant subsurface penetration. This was verified with surveys of two lakes (Rose and Killarney Lakes) and it was decided to eliminate the surveys in the remaining lakes (Cave and Medicine Lakes).

River - Expanded river coverage was initiated when it was determined that the geophysical methods were not effective in the lakes. This expanded coverage consisted of running additional survey transects at 300 meters and 600 meters upstream and downstream of five transects (Dudley, Killarney, Medimont, Swan, and Harrison). Due to the shallow water depths, the survey of the Cataldo transect was performed in a fan pattern along only three lines.

Floodplain - The floodplain survey was performed along the north Killarney floodplain transect from core station 1 to core station 3, a distance of 650 feet.

3. SAMPLING PROGRAM

Original plan: Sediment cores and samples originally scheduled to be collected are summarized in the following table.

Planned/Actual/Archive	CDR Main Stem	Lateral Lakes	Floodplains
Cores	20 planned	16 planned	60 planned
	21 actual	16 actual	48 actual
	2 archive	4 archive	0 archive
Samples (not including QA duplicates)	126 planned	48 planned	180 planned
	123 actual	34 actual	118 actual

Alteration: Field changes to the actual number of cores and samples collected are summarized in the table above. Cores collected and archived are also summarized in the table.

Cores - Specific changes to the number of cores collected were due to the following:

✔ One additional core was collected in the delta of the CDR.

✔ Twelve floodplain cores were not collected due to location inaccessibility: 1 core from Cataldo South, all 5 cores from Dudley North, 2 cores from Swan North, 3 cores from Harrison North, and 1 core from Harrison South.

✔ Six archive cores were collected: one from each of the four lateral lakes (Cave, Medicine, Killarney, and Rose Lakes) and two from the Harrison and Swan river transects.

Samples - Field changes in the collection of samples from the sediment cores were due to the following:

✔ Field test kit results of the floodplain cores indicated a contaminated layer sufficient for only one sample. In these cores, the second contaminated sediment sample originally intended for the core was eliminated. The uncontaminated sediment sample was collected as originally intended. Twenty-two of the 48 cores collected were determined in the field to only require 2 samples, not the originally planned 3 samples.

✔ Field test kit results of some lake cores indicated the absence of a contaminated layer. In these cores and due to the presence of only one lithology, only one sample was collected. For other lake cores, sediment recovery limited the number of samples to two. For the 16 cores collected, 4 cores included the originally planned 3 samples; 10 cores included 2

samples; and 2 cores included 1 sample.

✔ The actual thickness of sediment recovered in the main stem CDR cores was less than originally planned for the 12 foot to 30 foot cores. Actual sediment recovered in these cores was less than the total length of the core ranging from 4 foot to 14 foot of sediment recovered (24 to 67 percent). The original plan was to collect samples by homogenizing 3 foot sections of the core. However, due to the reduced recovery a minimum of 1 foot sections were homogenized. The originally planned samples from each core were collected if a sufficient length of core was recovered. For cores originally scheduled for 6 samples, the core was separated into 6 equal sections, each section was no less than 1 foot in length. For some cores, insufficient core recovery limited the number of samples that could be collected. This occurred in 2 cores from the Cataldo transect that had recovery of 5 and 4 feet of sediment. For these cores, only 5 and 4 samples were collected, these cores were originally intended to produce 10 samples each.

Location - The Killarney floodplain transect was located approximately 0.5 mile upstream from the location of the former USGS river coring transect. This was discovered after 6 of the 10 floodplain cores had been collected. The floodplain transect continued in a straight line, where possible, and was not relocated to match the USGS river transect location.

4. SAMPLE TRACKING

During the collection of 305 samples the following 4 sample tracking paperwork errors were noted:

✔ It was discovered at the laboratory that the chain of custody (form number 351219) incorrectly listed the Contract Laboratory Sample Numbers for samples MJQ363 (URS sample number LCDR360) and MJQ364 (URS sample number LCDR361). The chain of custody listed the contract laboratory numbers as MJP363 and MJP364, after checking with the sampling team, the numbers on the chain of custody were corrected.

✔ It was discovered at the laboratory that sample MJQ396 (URS sample number QA401) was not identified on the chain of custody (form number 001247) as an equipment rinsate sample. After checking with the sampling team, the chain of custody was corrected to indicate the sample as an equipment rinsate.

✔ EPA sample number 97514833 was assigned to two samples: MJP730 (URS sample number LCDR027) on chain of custody number form 351210 and MJP731 (URS sample number LCDR028) on chain of custody form number 351219. Sample number MJP731 was reassigned EPA sample number 97514874.

✔ The analyses were not specified for the samples submitted to the laboratory with chain of custody form number 340899. The field sampling team submitted correspondence to EPA documenting that total metals analyses were requested for the samples submitted under chain of custody form number 340899.

Adit Drainage, Seep, and Creek Surface Water Sampling

1. SUMMARY

Changes to the field sampling plan detailing the *Adit Drainage, Seep, and Creek Surface Water Sampling* (Addenda 02, dated October 22, 1997) are documented in this section. The surface water sampling activities were conducted in November, 1997, with some follow-up sampling on Canyon Creek conducted in January, 1998. Field changes are summarized in the following sections dealing specifically with the survey and sampling efforts.

2. ADIT DRAINAGE AND SEEP SURFACE WATER SAMPLING

Original plan: Forty-eight known adit drainages or seeps within the area were identified to be sampled.

Alteration: One hundred and thirteen adit drainages or seeps were added to the original list making a total of 161 adit or seep sites. Forty-three adit or seep sites were located and sampled, and flow measurements and field parameters were documented. A list of all the sites and the adit drainages or seeps that were sampled is attached. The actual number of adit drainages and seeps sampled is less than the total number of sites due to the sampling activities occurring during a low flow season and the sites were dry. Due to the weather some sites were not accessible and some adit drainage and seep sites were frozen.

3. SAMPLING PROGRAM

Original plan: Surface water samples originally scheduled to be collected along the South Fork of the Coeur d'Alene River (SFCDR) and the identified tributaries are summarized in the following table.

Samples (not including QA duplicates)	SFCDR Main Stem	SFCDR Tributaries	Pine Creek	Canyon Creek	Nine Mile Creek
Planned	25	46	10	17	17
Actual	25	42	9	25	16

Alteration: Field changes to the actual number of surface water samples collected are summarized in the table above. Four of the tributaries that discharge directly to the SFCDR were dry and

therefore not sampled. One station on Pine Creek was unable to be located. Of the 17 sites on Nine Mile Creek, one tributary was dry and not sampled. Of the 17 sites on Canyon Creek, one tributary was dry and not sampled. However, nine stations on Canyon Creek were resampled in January, 1998, see additional discussion below.

During the November, 1997, surface water sampling effort, Silver Valley Natural Resource Trustees construction activities on Canyon Creek resulted in elevated turbidity in the creek below the town of Frisco. After discussion with the EPA, and interested parties, it was decided that the surface water sampling of Canyon Creek would be completed as originally planned. Resampling of the nine impacted sampling locations within and down gradient of the construction activity was planned to occur when construction activity ceased operation for the winter.

The Silver Valley Natural Resource Trustees construction activities on Canyon Creek ceased in late December. Resampling of the impacted surface water sampling locations occurred during the week of January 12, 1998. Resampling activities included the nine impacted stations as well as one station upstream of the construction activity.

The January resampling effort of the ten locations attempted to follow the methods presented in the Addenda 02 sampling plan. These efforts include the collection of water quality parameters, stream flow measurements, and surface water samples for chemical analysis. Work plan deviations during the resampling efforts included:

- ✔ Nine of the ten surface water locations were successfully sampled for field parameters and chemical analysis. Due to snow and ice accumulation, one location downstream of the mouth of Canyon Creek on the SFCDR could not be resampled. This reach of the SFCDR in this area was to dangerous to access due to the creek ice cover, and the accumulated compact snow cover on the steep banks.

- ✔ Due to the heavy ice cover over Canyon Creek, flow measurements were only able to be collected at one station. The ice and compressed snow cover over the creek varied from 4 inches to 8 inches in thickness. Usually only the center portion of the steam was exposed, and offered the only location to collect the surface water samples. The heavy accumulation of ice cover prohibited accurate stream flow measurement by the flow meter technique used in November, 1997.

- ✔ The locations occupied for resampling may have varied from the November site locations. This was necessary because the original site marker stakes were buried under accumulated snow and could not be located and because access to the stream was limited in some areas to openings in the ice. Global positioning system (GPS) coordinates were collected for each resampled location.

4. SAMPLE TRACKING

During the collection of 198 samples (including QA duplicates, equipment rinsates, and field blanks) the following 5 sample tracking paperwork errors were noted:

- ✔ The laboratory noted that duplicate sample numbers were received for EPA regional tracking number 97464850, designated for dissolved metals analysis. The duplicate sample was re-assigned by the laboratory using EPA regional tracking number 97464250.

- ✔ EPA regional tracking number 97464992 was incorrectly listed on the chain of custody using number 97469992. The incorrect number was crossed out on the chain of custody by the laboratory and replaced with the correct sample number.

- ✔ EPA regional tracking number 97464799 was incorrectly listed on the analyses requested form using number 97469329. This error was identified and corrected by comparing the analyses, site code, chain of custody, and bottle tag. The incorrect number was crossed out on the analyses requested form by the laboratory and replaced with the correct sample number.

- ✔ Some samples were submitted to the laboratory with the general chemistry analysis and dissolved metals analysis labels switched. The laboratory was able to correct this error by identifying which samples were preserved.

- ✔ EPA regional tracking number 97464092, 97464093, and 97464099 submitted for general chemistry analyses and EPA regional tracking numbers 97464990, 97464991, and 97464997 submitted for dissolved metals analyses were not listed on the appropriate analyses requested form. These sample numbers were listed on the chain of custody. The laboratory added the appropriate sample numbers to each analyses requested forms according to the information on the chain of custody and the bottle tags.

Sediment Sampling Survey in the South Fork of the Coeur d'Alene River, Canyon Creek, and Nine-Mile Creek

1. SUMMARY

Changes to the field sampling plan detailing the *Sediment Sampling Survey in the South Fork of the Coeur d'Alene River, Canyon Creek, and Nine Mile Creek* (Addenda 03, dated October 24, 1997) are documented in this report. Sediment sampling activities were conducted in January, 1998. Field changes are summarized in the following sections dealing specifically with the survey and sampling efforts.

2. SEDIMENT SAMPLING SURVEY

2.1 OBJECTIVES

Original plan: Collect sediment samples from transects along the South Fork of the Coeur d'Alene River (SFCDR), Ninemile Creek, and Canyon Creek.

Alteration: **Pine Creek** - The sediment sampling survey was expanded to include the lower reach of Pine Creek and the East Fork of Pine Creek. Pine Creek was added because of the potential of significant sources in this tributary.

2.2 SCOPE

Field Survey

Original plan: The sediments will be field screened to depths at which the pre-mining sediments are encountered. Samples will only be collected of the mining-impacted sediment overburden.

Alteration: Terrain features (e.g., boulder, cobble, steep terrain) and environmental conditions (e.g., snow accumulation, frozen soil) hampered excavation at sampling sites where only hand tools could be used. In those cases the sediments were field screened from the achievable excavation depths.

Sediment Sampling

Original plan: Sediment samples will be collected at each river mile.

Alteration: Best attempts were made to occupy a sampling station at each river mile. Deviations up or down stream from the originally identified location did occur due to inaccessibility,

especially when the backhoe was used for the test pit excavations. Other factors that affected access included private property restrictions, or location of convenient access roads.

3. SAMPLING PROGRAM

Original plan: Transect locations will be documented using global positioning system (GPS) and Universal Transverse Mercator (UTM) coordinates.

Alteration: GPS coordinates were collected at all locations with the exception of a few locations where the steep terrain or forest cover prevented the reception of a minimum required number of satellites needed for an accurate position fix. Each site location was also documented on a USGS quad map for reference.

Sediment Sampling Procedures

Original plan: At each floodplain excavation, three sediment samples will be collected; one at the surface, one approximately one-half the sediment thickness depth, and one at the base of the mining impacted sediments. Only one sample will be collected from the approximate midpoint of the stream.

Alteration: The actual number of sediment samples varied from 1-2 samples per test pit. For sites that could be accessed by backhoe, the test pit was excavated down to the creek water table. In many cases the lead test strips indicated concentrations of lead in the upper layer, however a test for the lower uncontaminated layer could not be conducted because a representative sample could not be collected from below the water level in the test pit. When the test strips indicated no lead detection, only a confirmation sample was collected. The field team using hand tools for creek floodplain excavations were limited by physical constraints (e.g., boulders, cobbles, and frozen soil). The hand tool methods were impractical in obtaining a mid-creek sediment sample. In addition, some floodplains had been reworked by floods or recent remediation activities. Obtaining samples of mining-impacted sediments in these reworked areas was not practical.

Sampling Locations

Original plan: The background stream sediment transects were established upstream of known mining sites. A total of 23 transects were located on the SFCDR, 9 on Canyon Creek, and 7 on Ninemile Creek.

Alteration: Field changes to the surveys are summarized below:

Pine Creek: Eleven sites covering lower Pine Creek and the east fork of upper Pine Creek were

included as addressed in the **Objectives** discussion of this alteration report. Nine of the locations were sampled with the use of a backhoe and two locations were sampled using hand tools.

Ninemile Creek: Five of seven proposed sampling locations on Ninemile creek were successfully sampled. The background location, NM01, could not be sampled due to inaccessibility created by heavy snow accumulation. Location NM03 was also inaccessible due to deep snow. All of the successful sampling locations on Ninemile Creek were accomplished using a backhoe.

Canyon Creek: Five of nine proposed sampling locations on Canyon Creek were successfully sampled. The background location, CC01, could not be sampled due to inaccessibility from deep snow accumulation. Locations CC03, CC04 and CC05 could not be accessed by backhoe. The snow height at these locations prohibited access to the creek, and prevented the geologist from defining the extent of the flood plain. All of the successful sampling locations on Canyon Creek were accomplished using a backhoe, with the exception of CC02, where hand tools were used.

SFCDR: Nineteen of twenty-three proposed locations were successfully sampled. Four locations were accomplished using a backhoe, and the remaining fifteen were sampled using hand tools. Location SF02 was not attempted since it was on private land and permission to access the property had not been obtained. Three sample designations (SF21, SF22 and SF23) were not used because the area from Kellogg to the background location was covered with twenty stations. This was due to the fact that some of the sample locations could not be sampled at exactly every river mile due to difficulty in creek access. Some of the locations sampled by hand tools could be sampled on only one floodplain bank due to conditions on the opposite bank (i.e. boulder accumulation) or inaccessibility due to the creek depth being to deep for wading.

Sample Handling

Original plan: Sediment samples originally scheduled to be collected are summarized in the following table.

Addenda 03 Sediment Sampling Inventory
(not including QA or duplicate samples)

Tributary	Planned	Actual
Nine Mile Creek	49	19
Canyon Creek	63	14
SFCDR	161	47
Pine Creek	0	47

Alteration: Field changes to the actual number of sediment samples collected are summarized in the table above.

SAMPLE TRACKING

During the collection of 150 samples one sample tracking paperwork error was noted.

✔ The entire chain of custody (form number 351225) was inadvertently sent to the laboratory, Sentinel, Inc., without removing the first two copies intended for the EPA. EPA sample control was notified and arrangements were made to have the top copies returned to the EPA.

Erratum for
Field Sampling Plan Alterations for
FSPA No. 1

ERRATUM FOR FSPA NO. 1 ALTERATION REPORT

Several deviations were identified to the *Field Sampling Plan Alterations for the Bunker Hill Facility/Coeur D'Alene Basin Project, Shoshone County, Idaho* dated February 1998.

In section 2, Geophysical/Bathymetric Survey, the alteration report incorrectly states that expanded river coverage was initiated when geophysical methods were not effective in the lakes. Since the field sampling plan only specified the total number of transects to be surveyed (30 to 40) and did not specify the locations of the transects, there were no deviations in the number (40 actually surveyed) and locations of the transects.

The following deviations did occur during implementation of the geophysical/bathymetric survey and were not included in the alteration report:

- River - Both an acoustic method (SBP) and electromagnetic method (GPR) were used for sub-bottom profiling in the Coeur d'Alene River.

- Floodplain - The electromagnetic method (GPR) was used instead of the acoustic method for subsurface sediment profiling along one of the floodplain transects of the Coeur d'Alene River.

- Floodplain - The subsurface sediment profiling along one transect was not completed because there were no clearly definable reflectors that could be interpreted as the interface between mining-impacted sediments and native sediments.

In addition, the results of the geophysical/bathymetric survey were to be used for two purposes. If the results in the main stem Coeur d'Alene River were successful in reflecting the information collected by the USGS sampling at the Dudley and Killarney transects, core samples were not to be collected in Coeur d'Alene River channel at any of the four planned transects. If the results were successful for the Lateral Lakes and the floodplain, the coring samples were to be moved from the default locations to areas where the geophysics showed the thickest layer of mining impacted sediments within the lakes and floodplains. If the acoustic surveys were not successful or not definitive, the default river, lake, and floodplain locations specified in Task 2 were to be sampled. This plan could not be implemented due to the schedule. Originally, the geophysical/bathymetric survey was to be performed about a month prior to the coring to allow time to interpret the results of the survey. Because of the schedule, the geophysical/bathymetric

survey could not be performed a month prior to the coring. Therefore, adequate time was not available to interpret the results of the survey and the default river, lake, and floodplain locations were sampled.

In section 3 of the alteration report, the description of the field changes implemented during the sampling of cores is incomplete and inaccurate. Changes to both the "Cores" subsection and the "Samples" subsection are needed. A discussion of the changes to coring depths was not included in the "Cores" subsection. The following describes the field changes to the coring depths:

- In 21 cores, the coring depth achieved was less than the planned coring depth. The planned coring depth was not achieved in 9 cores in the main stem of the Coeur d'Alene River. The planned coring depth was not achieved in one of the Lateral Lakes cores, and the planned coring depth was not achieved in 11 of the Coeur d'Alene Floodplain cores.

In addition, the subsection labeled "samples" should read as follows:

- Only two samples were obtained from 26 of the 48 floodplain cores. (Note: The alteration report incorrectly stated that two samples were obtained from only 22, not 26, cores.) Three samples, the number of planned samples, were obtained from the remaining floodplain cores. The number of samples collected depended on the lead distribution in the core as well as the core lithology. Lead was not detected at all in 18 of the 48 cores using the field lead test kit. Of these 18 cores, three samples were obtained from five of the cores and two samples were obtained from 13 of the cores. The number of samples in the cores with no lead detections depended solely on the lithology of the core. In the remaining cores, the number of samples collected depended on the lead distribution as well as the core lithology. If the contaminated layer was thin and the lithology of the core was relatively uniform, then only two samples were obtained. If the contaminated layer was thick or the lithology was not uniform, then three samples were obtained from the core.

- One sample was obtained from 2 of the 16 lake cores; two samples were obtained from 10 of the 16 lake cores; and three samples, the number of planned samples, were obtained from 4 of the 16 lake cores. The number of samples collected depended on the lead distribution in the core as well as the core lithology. Lead was not detected in 13 of the 16 cores using the field lead test kit. Of these 13 cores, three samples were obtained from one of the cores, two samples were

obtained from 10 of the cores, and one sample was obtained from two of the cores. The number of samples in the cores with no lead detections depended solely on the lithology of the core. In the remaining three cores, lead was detected and three samples were collected.

- Due to sediment compaction during coring in the main stem of the Coeur d'Alene River, the actual thickness of sediment recovered was less than planned. The actual thickness of the sediment recovered in these cores ranged from 4 feet to 14 feet, much less than the planned 12 to 30 feet. The original plan was to collect samples by homogenizing 3-foot sections of the core. However, due to the reduced recovery a minimum of 1-foot sections were homogenized. The number of samples originally planned was collected if sufficient material was recovered from the core. For some cores, insufficient core recovery limited the number of samples that could be collected. This occurred in two cores from the Cataldo transect which had recovery of 5 and 4 feet of sediment. For these cores, 5 samples were collected from one core and 4 samples were collected from the second core. Ten samples were originally planned for these two cores.

Section 3 should note that a vibracorer was not used for coring. A hybrid device (Mud Mole) was used instead. This corer is advanced into the sediment by means of a pneumatic hammer operated at about 5 Hz. This type of coring device was selected after careful evaluation of the options. In addition, a field test was performed to compare the vibracorer to the Mud Mole. The Mud Mole was found to have superior penetration, with similar to superior sediment recovery. In addition, Section 3 should not that sediment was extruded from the core tubes. In order to prevent further compression of the sediment, the core tubes were cut open for sampling and lithologic evaluation. Therefore, compression of the sediment only occurred during the actual coring.

Erratum for
Field Sampling Plan Alterations for
FSPA No. 2

ERRATUM FOR FSPA NO. 2 ALTERATION REPORT

Several deviations were identified to the *Field Sampling Plan Alterations for the Bunker Hill Facility/Coeur D'Alene Basin Project, Shoshone County, Idaho* dated February 1998. The following is a list of the deviations found:

- Seven sampling locations were added in the field, but were not mentioned in the alteration report. These are NF1, LC3, SF2, SJ4, SR5, SR6, and SR7.

- The alteration report indicated that the 9 Canyon Creek sampling locations that were resampled in January of 1998 may have varied from the November site locations. Based on discussions with personnel involved with the resampling effort, these changes in location were not significant. Therefore, no new location IDs are required for the samples collected during the January resampling.

- The text indicated that a list of all of the adits and seeps that were sampled was attached to the report. However, this list was accidentally left out. However, this list was included in the *Draft Field Sampling Plan and Quality Assurance Project Plan Addenda for the Bunker Hill Basin-Wide RI/FS, Addenda 04, Adit Drainage, Seep, and Creek Surface Water Sampling; Spring 1998 High Flow Event.*

- The following is a list of the corrections to the adit and seep site description list included in FSPA No. 4.

    1. The list states that Fanny Gremm was not sampled because it was dry. However, all of the other mines in the area were inaccessible. Therefore, Fanny Gremm also must have been inaccessible.

    2. The list states that Military Mine is on Canyon Creek; however, Military Mine is actually on the Upper South Fork.

    3. The list states that the adit at the National Mine was not sampled because it was dry. According to the field notes, National Mine was not sampled because the adit drainage is pumped to an unknown location.

4. The list states that the Hercules No. 4 adit was not sampled because it could not be located. According to the field notes, this adit was not sampled because it was inaccessible.

5. The list states that the Hecla No. 3/Star Tunnel adit was not sampled because it was dry. According to the field notes, this adit was not sampled because it could not be located.

6. The list states that the Coeur Unit was not sampled because it discharges to a permitted tailings pond. However, the logbook states that it was not sampled because the adit was dry.

7. The list states that the Coeur d'Alene Mine (Mineral Point) was sampled. However, the field crew accidentally sampled the wrong mine. The sample was obtained at the Merger Mine.

8. The list states that S. F. fraction was not sampled because it was inaccessible. However, it was later determined that the field crew attempted to sample the wrong location.

9. The list states that the Hilarity adit and Hilarity waste rock pile seep were both dry. The logbook states that they were not sampled because both had very low flow.

10. The list states that Big It is a seep; however, during field investigations it was found to be an adit.

- The original plan was to sample 49 known adit drainages or seeps, not 48. One hundred and twelve adit drainages or seeps were added to the original list, not 113. These two discrepancies are the result of counting Marsh No. 1 and Marsh No. 2 as one adit in the original list of sampling locations. Finally, one seep, North Amy (PC329), and one adit, Merger Mine (SF388), were added during field activities. Therefore, the total number of adits and seeps at which sampling was attempted is 163. In addition, the number of adits and seeps sampled was 44, not 43 as indicated in the alteration report.

- Up to 71 samples, not 46, were planned along the South Fork tributaries. These 71 samples included 46 at defined locations, and up to 25 locations along

previously unsampled tributaries. These 25 additional locations were to be determined based on the sampling results from the first 46 sampling locations, which were to undergo fast turn-around analysis. If high metals concentrations were detected in the tributary at the confluence with the South Fork, then additional locations were to be sampled along the tributary to determine the source of the high metals concentrations. However, this additional sampling was not performed because of weather conditions. The low flow sampling was not initiated until November, and sampling crews were having difficulties accessing areas because of snow. Therefore, sampling additional locations based on results received from the fast turn-around analysis was not possible during the low flow event.

- The number of surface water river/creek samples collected along the South Fork is 24, not 25, and the number of surface water river/creek samples collected along the South Fork tributaries is 43, not 42. This is because one sample was collected from Weyer Gulch (SF231) instead of the South Fork below Weyer Gulch.

- The alkalinity sample number for PC329 is incorrectly listed on the sample tracking table and the surface water sampling record as 97464854. The correct number for this sample is 97464251. (Note that the correct sample number is in TDM and on the form from the laboratory with the actual data.)

- The alkalinity sample number for CC388 was incorrectly changed from 97474703 to 97474701 on the surface water sampling record. The correct number for this sample is 97474703. (Note that the correct sample number is in TDM and on the form from the laboratory with the actual data.)

Erratum for
Field Sampling Plan Alterations for
FSPA No. 3

ERRATUM FOR FSPA NO. 3 ALTERATION REPORT

Several deviations were identified to the *Field Sampling Plan Alterations for the Bunker Hill Facility/Coeur D'Alene Basin Project, Shoshone County, Idaho* dated February 1998. The following is a list of the deviations found:

Sediment sampling activities were conducted in December 1997 and January 1998, not just in January.

The section discussing the alterations to the sediment sampling procedures is incomplete. A complete description of the alterations is provided in the following paragraphs:

Because of the difficulty of excavating in the rocky soil using hand tools, the excavation method was changed, where possible. For locations accessible by backhoe, a backhoe was used instead of hand tools. Hand tools were only used if the sampling station was inaccessible to the backhoe. One field crew was responsible for sampling using the backhoe and a second field crew was responsible for sampling locations using hand tools. Because of the inherent difficulties of sampling with hand tools, the hand tool field crew was not successful in obtaining samples at a number of locations. This is discussed in more detail in the following paragraphs.

At each transect, samples were to be collected at three stations/locations. One station was to be located on each side of the river or creek (floodplain stations/locations), and one station was to be located at the approximate mid-point of the river/creek (river station/location). Sediment samples could only be collected at all three stations/locations at 24 transects. Frequently, river station/locations could not be sampled when hand tools were used to obtain the samples. These stations/locations were not sampled due to the presence of boulders and cobbles, which made excavation with hand tools not possible, and/or were not sampled due to the depth and speed of the river, which made sampling unsafe. Sediment samples were not obtained from the river stations at the following transects: CC02, NM02, PC10, SF03, SF04, SF05, SF06, SF07, SF08, SF10, SF12, SF14, SF16, SF17, SF19, and SF20.

In addition, only one of the two floodplain locations/stations was sampled at some of the transects. Floodplain stations/locations were not sampled because of the

presence of riprap or a concrete wall along the bank of the river/creek, were not sampled because sediments were not found in the floodplain of the river/creek, or were not sampled because the location was inaccessible. Sediment samples were not obtained from the floodplain stations at the following transects: SF04, SF10, SF11, SF12, and SF19.

GPS coordinates were obtained for most of the locations. GPS coordinates could not be obtained for a few locations where the steep terrain or forest cover prevented the reception of a minimum required number of satellites needed for an accurate position fix. Each site location was also documented on a USGS quad map for reference.

As planned, only one sediment sample was obtained from the river stations that were sampled. The excavation method, hand tools or backhoe, did not impact the number of samples collected at each river station. However, the depth of the excavation at the floodplain sampling stations depended on the method being used for excavation, and the concentration of lead detected using the lead test strips. If hand tools were used, a test pit was excavated only if the lead test strips showed detectable levels of lead in surface sediments. The depth of excavation in this case depended on field conditions such as the presence of boulders, cobbles, bedrock, frozen soil, and/or a shallow water table. If the backhoe was used, the test pits were excavated to approximately the depth of the water table. Sediments were not tested for lead prior to excavation of the test pit using the backhoe. The planned approach could not be used for most test pits because the concentration of lead in most test pits was either not detectable or less than 200 ppm. Where the concentration of lead was found to be greater than 200 ppm, environmental conditions described above often limited the depth of excavation and the test pit was not excavated to pre-mining sediment depths. Only in some cases could the test pits be excavated to below the mining-impacted sediments.

Between one and two sediment samples were collected from each floodplain station/location. This is a deviation from the three planned sediment samples which were to be collected from each floodplain station/location. The approach used for sampling floodplain stations depended on the excavation method. Both approaches deviated from the planned floodplain station sampling approach.

The field crew, which utilized hand tools for excavation and sampling of floodplain stations, field tested and sampled surface sediments at all locations with sediments present. Only if the field test showed a concentration of lead

greater than 200 ppm was the location excavated to pre-mining sediments, if environmental conditions allowed. A second sample was then obtained from the pre-mining sediment layer. Therefore, at most two samples were obtained: one from the mining-impacted sediment layer and one from the pre-mining sediment layer.

The field crew, which utilized the backhoe for excavation and sampling of floodplain stations, field tested between two and three depths in each test pit. Three samples, the number of planned samples, were not obtained from any floodplain locations excavated with a backhoe. At most locations, only one sample was obtained if lead concentrations were less than 200 ppm according to the field test. However, there were several locations where two samples were obtained, even though the lead test kit showed concentrations less than 200 ppm. These are locations NM767, PC806, PC808, PC813, PC815, PC818, PC821, PC824, PC826, PC830, PC832, PC835, PC837, PC840, PC843, PC846, PC848, PC852, SF544, SF547, and SF550. Two samples were obtained at these locations instead of one because of the geology of the sediments. If lead concentrations were greater than 200 ppm according to the field test kit, usually two samples were obtained, unless environmental conditions prevented the collection of two samples. At three locations (NM760, NM754, and SF541), one sample was obtained in the mine-impacted surface layer of sediments and one sample was obtained in the pre-mining sediment layer. At one location (NM763), a sediment sample could not be obtained from below 3 feet, because the excavation pit was collapsing. Therefore, the sediments could not be tested to determine the depth of the pre-mining sediments. Two samples were obtained from the pit: one from the shallow uncontaminated sediments and one from the deeper contaminated sediments. Only one sample was collected from location NM758 due to the limited depth of the excavation. The sample was collected from mining-impacted sediments. Due to the presence of groundwater at approximately 1 foot bgs, further excavation of the test pit was not possible, and pre-mining sediments were not found in this test pit. Two sediment samples were obtained from location NM751. Due to the presence of groundwater at approximately 2.5 feet bgs, further excavation of the test pit was not possible, and pre-mining sediments were not found in this test pit.

Field Sampling Plan Alteration No. 1 for
FSPA No. 4

FIELD SAMPLE PLAN ALTERATION
FOR THE

ADIT DRAINAGE, SEEP, AND CREEK SURFACE WATER SAMPLING; SPRING 1998 HIGH FLOW EVENT

BUNKER HILL FACILITY/COEUR D'ALENE BASIN
SHOSHONE COUNTY, IDAHO

Prepared for:

United States Environmental Protection Agency
Work Assignment No. 54-20-02QC
Contract No. 68-W9-0054 / 0031
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

May 1, 1998

Prepared by:

URS Greiner
2401 Fourth Avenue, Suite 1000
Seattle, Washington 98121

and

CH2M Hill
777 108th Avenue NE
Bellevue, Washington 98009

URSG DCN 4162500.1715.05.b

Project: Bunker Hill Facility/Coeur d'Alene Basin
Contract No: 68-W9-0054
Work Assignment No: 54-50-02QC
URSG Doc. Control No: 4162500.1715.05.b

CONTENTS

FIGURES

TABLES

ACRONYMS

NFCDR	North Fork of the Coeur d'Alene River
SFCDR	South Fork of the Coeur d'Alene River
URSG	URS Greiner, Inc.
USGS	U.S. Geological Survey

ADIT DRAINAGE, SEEP, AND CREEK SURFACE WATER SAMPLING SPRING 1998 HIGH FLOW EVENT

1. SUMMARY

Changes to the field sampling plan detailing the *Adit Drainage, Seep, and Creek Surface Water Sampling; Spring 1998 High Flow Event* (Addenda 04, dated April 24, 1998) are documented in this report. These changes were made prior to initiating the field efforts on May 4, 1998.

2. USGS COORDINATION

Original plan: Coordinate sampling of Pine Creek, Canyon Creek, and Nine Mile Creek to occur during a high flow event.

Alteration: This sampling effort will be coordinated with Rick Backsen, United States Geological Survey (USGS) Sandpoint (208-263-4123), who will notify the field crew of the beginning of a high flow event (assumes a 12 hour notice). Pine Creek, Canyon Creek, and Nine Mile Creek will not be sampled until this event occurs or the third week of the field effort (if a high flow event does not occur). While the URS Greiner (URSG) field crews sample these creeks, the USGS will be collecting samples from 9 stations within the basin. At each of these 9 stations, USGS will collect 6 surface water samples at varying times during the hydrograph. URSG will provide the USGS with sufficient bottles to collect these 54 samples (108 unpreserved and 108 preserved liter bottles). URSG will also provide USGS with sample numbers and will submit the samples to the laboratory for analysis.

3. SAMPLE NUMBERS

Original plan: URSG sample numbers assigned to this project were 169000 through 169500.

Alteration: URSG sample numbers assigned to this project are 46281 through 46700.

4. NORTH FORK RIVER SAMPLES

Original plan: The original plan indicated that 75 samples would be collected within the North Fork of the Coeur d'Alene River (NFCDR) basin. Specific locations for these samples were not provided (refer to page 9 of the workplan).

Alteration: Detailed descriptions are provided in Table 1 for 47 sampling locations within the NFCDR basin. Additionally, these locations are shown in Figure 1.

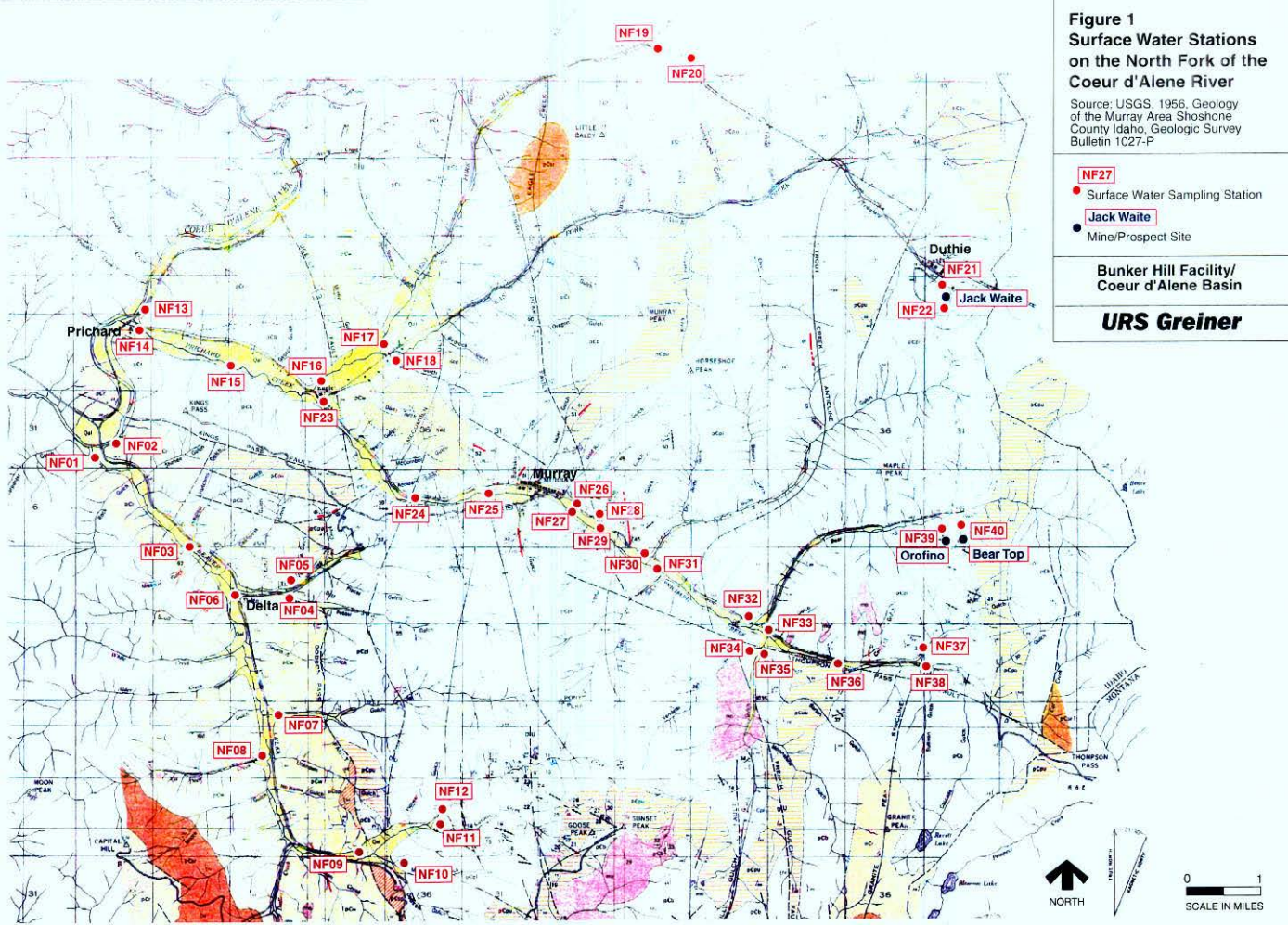


Figure 1
Surface Water Stations on the North Fork of the Coeur d'Alene River

Source: USGS, 1956, Geology of the Murray Area Shoshone County Idaho, Geologic Survey Bulletin 1027-P

Bunker Hill Facility/ Coeur d'Alene Basin

URS Greiner

Table 1
Surface Water Sampling Stations on the North Fork of the Coeur d'Alene River

Station	Location Description
NF01	Beaver Creek between Carpenter Gulch and NFCDR
NF02	NFCDR upstream of Beaver Creek
NF03	Beaver Creek downstream of Prospect Gulch
NF04	Potosi Gulch upstream of Trail Creek
NF05	Trail Creek between Poorman Gulch and Potosi Gulch
NF06	Beaver Creek upstream of Trail Creek
NF07	Pony Gulch upstream of Beaver Creek confluence
NF08	Deer Creek upstream of Beaver Creek confluence
NF09	Beaver Creek downstream of confluence with Missoula Gulch
NF10	Missoula Gulch upstream of Dobson Gulch
NF11	Carbon Creek upstream of Beaver Creek confluence
NF12	Beaver Creek upstream of Carbon Creek confluence
NF13	NFCDR upstream of confluence with Prichard Creek
NF14	Prichard Creek upstream of NFCDR confluence
NF15	Prichard Creek between confluence with NFCDR and confluence with Eagle Creek
NF16	Eagle Creek upstream of Prichard Creek confluence
NF17	West Fork Eagle Creek upstream of confluence with East Fork Eagle Creek
NF18	Fancy Gulch upstream of East Fork Eagle Creek confluence
NF19	Cottonwood Creek upstream of confluence with West Fork Eagle Creek
NF20	Cottonwood Creek; 1 mile upstream of confluence with West Fork Eagle Creek
NF21	Tributary above East Fork Eagle Creek upstream of Duthie; downstream of Jack Waite (61)
NF22	Tributary above East Fork Eagle Creek upstream of Duthie; upstream of Jack Waite (61)
NF23	Prichard Creek upstream of confluence with Eagle Creek
NF24	Prichard Creek upstream of confluence with Accident Gulch
NF25	Prichard Creek downstream of confluence with Tiger Gulch
NF26	Cougar Gulch upstream of confluence with Prichard Creek
NF27	Prichard Creek upstream of confluence with Cougar Gulch
NF28	Wesp Gulch upstream of confluence with Prichard Creek

Table 1 (continued)
Surface Water Sampling Stations on the North Fork of the Coeur d'Alene River

Station	Location Description
NF29	Prichard Creek upstream of confluence with Wesp Gulch
NF30	Butte Gulch upstream of confluence with Prichard Creek
NF31	Prichard Creek upstream of confluence with Butte Gulch
NF32	Bear Gulch upstream of confluence with Prichard Creek
NF33	Prichard Creek upstream of confluence with Bear Gulch; downstream of Vendetta/Moonshine Gulch
NF34	Vendetta Gulch upstream of confluence with Prichard Creek
NF35	Moonshine Gulch upstream of confluence with Prichard Creek
NF36	Prichard Creek downstream of confluence with Cement Gulch
NF37	Paragon Gulch upstream of confluence with Prichard Creek
NF38	Prichard Creek upstream of confluence with Paragon Gulch; downstream of Sullivan Gulch
NF39	Tributary off of Bear Gulch; below Orofino (44)
NF40	Tributary off of Bear Gulch; below Bear Top (43)
NF41	Prichard Creek "opportunistic" sample
NF42	Prichard Creek "opportunistic" sample
NF43	Prichard Creek "opportunistic" sample
NF44	Prichard Creek "opportunistic" sample
NF45	Prichard Creek "opportunistic" sample
NF46	Prichard Creek "opportunistic" sample
NF47	Prichard Creek "opportunistic" sample

NFCDR - North Fork of the Coeur d'Alene River (not the Little North Fork)
"Opportunistic" samples will be collected from pools found along Prichard Creek (field determined)
Mine site numbers 43 (Bear Top), 44 (Orofino), and 61 (Jack Waite) are identified from the source map used for Figure 1 (USGS Bulletin 1027, Plate 57)

5. PRIORITIZED SAMPLING

Original plan: The original plan for conducting the field work for this sampling effort was to dedicate two field crews to collect samples along the South Fork of the Coeur d'Alene River (SFCDR) and it's tributaries and dedicate two field crews to collect samples from the adit/seep

sites within the SFCDR basin. After completion of the sampling effort in the SFCDR, two field crews were intended to collect samples within the NFCDR basin.

Alteration: The sampling effort will be performed with the following priorities, which account for the potential for a high flow event that will limit access to all identified surface water stations:

1) Stations on the main stem of the SFCDR (20 total stations)
   a) If a high flow event occurs, the mandatory stations to be sampled are the 10 stations located at bridges: SF205, SF220, SF228, SF233, SF239, SF249, SF259, SF268, SF270, and SF271.
   b) If all stations on the main stem of the SFCDR are accessible, all 20 stations will be sampled.

2) Pine Creek, Nine Mile Creek, and Canyon Creek
   a) If a high flow event occurs, the mandatory stations to be sampled on these tributaries are the following stations: CC274, CC276, CC278, CC280, CC283, CC287 and NM289, NM291, NM293, NM295, NM296, NM298, NM299, NM303, NM305 and PC307, PC308, PC311, PC312, PC315.
   b) If all stations on these tributaries are accessible, all stations will be sampled.

3) Stations on the minor tributaries that discharge into the main stem of the SFCDR:
   a) If a high flow event occurs, only those tributary stations that are accessible will be sampled.
   b) If all minor tributary stations are accessible, all stations will be sampled.

4) All of the 47 sampling stations identified on the NFCDR will be sampled as stream flow conditions allow. Inaccessible sampling stations due to high flow conditions will be noted.

5) All 7 downstream samples will be collected as conditions allow. All of these stations are located at bridges and will be sampled with the appropriate field gear.

6) The 161 adit/seep sites identified in Attachment B of the workplan were placed in one of three categories. These priorities are assigned to the adit/seeps sites listed in Table 2. Field crew efforts during this field event will concentrate on the adit/seep sites in priority category 1. Adit/seep sites in categories 2 and 3 may need to be sampled during a separate event.
   a) Priority 1 - Known producers of moderate or large size (~~60~~ 79 sites)
   b) Priority 2 - Generally non-producers with drainage or older/higher adits associated with moderate to large mines (66 sites)
   c) Priority 3 - Adits sampled previously by the USFS only or known to be dry (16 sites)

Table 2
Priority Assignments to Adit/Seep Sites within the SFCDR Basin

Adit/Seep Name	Priority	Adit/Seep Name	Priority
Upper SFCDR			
Princeton-Magna	3	Lucky Friday	3
Silver Cliff	3	Goldhunter No. 5	2
Lewis and Clark	3	Goldhunter No. 6	1
Pandora	3	Bitter Root	3
Snowstorm No. 1	2	You-Like	2
Snowstorm No. 2	2	Fanny Gremm	2
Snowstorm No. 3	1	Morning No. 1	2
Snowstorm No. 4	2	Morning No. 2	2
Idaho Silver	1	Morning No. 3	2
Lucky Calumet	2	Morning No. 4	1
Snowshoe	2	Morning No. 5	1
Lucky Boy	2	Morning No. 6	1
Vindicator	3	Morning No. 6 waste rock pile	1
Missoula Tunnel	2	Star 1200 Level	1
National Mine	1	We-Like	1
Unnamed Adit	2	Grouse	1
Copper King	1	Alice	1
Reindeer Queen	1	Square Deal	1
Atlas	1	Golconda	1
Canyon Creek			
Blue Ribbon Group	3	Hecla No. 3/Star Tunnel	1
Military Mine	3	Anchor	2
Oom Paul No. 1	2	Sherman 1500 Level	1
Imperial/Aclides	2	Oreano Adit (Sherman)	1
Ajax No. 3	1	Campbell Adit (Standard-Mammoth)	1
Ajax No. 3 waste rock	1	Great Eastern	2
Gertie	2	Tamarack No. 7	1
Unnamed waste rock pile	2	Blackbear Fraction	2

Table 2 (continued)
Priority Assignments to Adit/Seep Sites within the SFCDR Basin

Adit/Seep Name	Priority	Adit/Seep Name	Priority
Canyon Creek (continued)			
Marsh No. 1	1	Blackbear No. 2	2
Marsh No. 2	1	Blackbear No. 3	2
Honolulu	2	Blackbear No. 4	2
Ajax No. 2	2	Frisco No.1	2
Benton	2	Frisco No.2	2
Stanley	2	Frisco No.3	2
Fairview/Wide West	2	Gem No. 1	2
Hercules No. 1	2	Gem No. 2	2
Hercules No. 2	2	Gem No. 3	1
Hercules No. 3	1	West Star	2
Hercules No. 3 waste rock pile	1	Canyon Silver-Formosa	1
Hercules No. 4	1	Star Pond area	1
Hercules No. 5	1	Woodland Park area	1
Hummingbird No. 4	2	Sisters	2
Hidden Treasure	1		
Nine Mile Creek - East Fork Ninemile Creek			
Sunset Tunnel	2	Tamarack No. 5	1
Little Sunset	2	Tamarack waste rock	1
Interstate-Callahan No. 4	1	Rex No. 1	1
Interstate-Callahan waste rock	1	Rex No. 2	1
Interstate-Callahan tailings	1	Rex tailings	1
Tamarack 400 Level	1	Success No. 1	2
Tamarack No. 1	1	Success No. 2	2
Tamarack No. 2	1	Success No. 3	1
Tamarack No. 3	1	Success tailings	1
Tamarack No. 4	1	Alameda	2

Table 2 (continued)
Priority Assignments to Adit/Seep Sites within the SFCDR Basin

Adit/Seep Name	Priority	Adit/Seep Name	Priority
Main Stem Ninemile Creek			
Dayrock Main Level	1	Ruth	1
Dayrock 100	1	Duluth	1
California	1	Silver Star	2
Monarch	1		
Lower SFCDR			
Caladay	3	Unnamed Location	3
Galena	2	Evolution	1
Merry Widow	3	St. Joe	3
Silverton	3	Silver Summit/Con Silver	1
Western Union (lower adit)	1	Silver Dollar	2
Western Union (upper adit)	1	Polaris	1
Wilbur	3	Sunshine	2
Osburn Flats	1	Crescent	2
Argentine	1	Big Creek Silver	2
Rainbow	1	Charles Dickens	2
Coeur Unit	2	New Hilarity	2
Unnamed Location	3	Alhambra	2
Coeur d'Alene (Mineral Point)	1		
Pine Creek - East Fork Pine Creek			
Upper Constitution	1	Sidney (Denver Creek adit)	2
Lower Constitution	1	Sidney Mill and Adit	1
Owl	2	Upper Little Pittsburg	1
Douglas	1	Lower Little Pittsburg	1
Marmion Tunnel	2	Little Pittsburg Tailings	2
Blue Eagle	2	Hilarity	2
S.F. Fraction	2	Hilarity Waste Rock Pile	2

Table 2 (continued)
Priority Assignments to Adit/Seep Sites within the SFCDR Basin

Adit/Seep Name	Priority	Adit/Seep Name	Priority
Pine Creek - East Fork Pine Creek (continued)			
Highland Surprise	1	Upper Lynch	2
Highland-Surprise waste rock pile	1	Lynch/Nabob	2
Nevada-Stewart	1	Nabob (1300 Level)	1
Below Nevada-Stewart	2	Big It	2
Sidney (Red Cloud Ck. adit)	1	Lookout	1
Main Stem Pine Creek			
Liberal King	1	Amy	1

Notes:
Adits/Seeps listed in downstream order (in general)
Priority 1 - Known producers
Priority 2 - Generally non-producers
Priority 3 - USFS sampled only or known to be dry

Field Sampling Plan Alteration No. 2 for
FSPA No. 4

FIELD SAMPLING PLAN ALTERATIONS FOR THE ADIT DRAINAGE, SEEP, AND CREEK SURFACE WATER SAMPLING; SPRING 1998 HIGH FLOW EVENT

BUNKER HILL FACILITY/COEUR D'ALENE BASIN PROJECT SHOSHONE COUNTY, IDAHO

Prepared for:

United States Environmental Protection Agency
Work Assignment No. 54-20-02QC
Contract No. 68-W9-0054 / 0031
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

June 5, 1998

Prepared by:

URS Greiner
2401 Fourth Avenue, Suite 1000
Seattle, Washington 98121

and

CH2M HILL
777 108th Avenue N.E.
Bellevue, Washington 98009

URSG DCN 4162500.1879.05.b

Project Name: Bunker Hill Facility/Coeur d'Alene Basin
Contract No.: 68-W9-0054
Work Assignment No.: 54-20-02QC
URSG Document Control No.: 4162500.1879.05.b

CONTENTS

ACRONYMS

EPA	U.S. Environmental Protection Agency
NFCDR	North Fork of the Coeur d'Alene River
SFCDR	South Fork of the Coeur d'Alene River
URSG	URS Greiner, Inc.
USGS	United States Geological Survey

ADIT DRAINAGE, SEEP, AND CREEK SURFACE WATER SAMPLING; SPRING 1998 HIGH FLOW EVENT

1. SUMMARY

This report documents changes to the field sampling plan which detailed the *Adit Drainage, Seep, and Creek Surface Water Sampling; Spring 1998 High Flow Event* (Field Sampling Plan Addenda 04, dated April 24, 1998). Adit, seep, and creek surface water sampling activities were conducted in May 1998. Prior to initiating the field work identified in this field sampling plan an alteration report *(Adit Drainage, Seep, and Creek Surface Water Sampling; Spring 1998 High Flow Event* Field Sampling Plan Alteration 01, dated May 1, 1998) was prepared that documented the surface water sampling stations in the North Fork of the Coeur d'Alene River (NFCDR) basin. This field sampling alteration report (Number 02) summarizes the changes to the original tasks identified in the field sampling plan addenda and the completion of a fourth task (not previously documented). These tasks include the following:

1 Surface water creek/river sampling
2 Adit drainage and seep surface water sampling
3 USGS coordination
4 Soil sampling at the Golconda Mine site

2. SURFACE WATER CREEK/RIVER SAMPLING

Original plan: A total of 132 sampling locations were identified on the South Fork of the Coeur d'Alene River (SFCDR) and its tributaries, 47 locations on the NFCDR, and 7 downstream locations. Table 1 summarizes the planned and actual samples collected for this field effort. Table 2 provides a comprehensive list of the surface water sampling stations including station number, sample number, duplicate sample number, a reason why the station was not sampled, and the station location description.

Table 1
Summary of Surface Water Creek/River Samples

Samples	SFCDR Main Stem	SFCDR Tributaries	Canyon Creek	Nine Mile Creek	Pine Creek	NFCDR	Down-stream
Planned	23	55	18	17	19	47	7
Actual	19	51	17	17	17	46	7

Table 2
List of Surface Water Sampling Stations

Station No.	Sample Number	Station Location Description
		South Fork of the Coeur d'Alene River
SF201	46531	Unnamed #1 above Klondike Gulch on south side
SF202	46530	Little North Fork
SF203	dry	O'Brien Gulch
SF204	46529	Unnamed #2 below O'Brien Gulch on south side
SF205	46540	SFCDR at road crossing below fish hatchery
SF206	46528	Daisy Gulch
SF207	46527	Gentle Annie Gulch
SF208	46533	SFCDR culvert pipe under road
SF209	46526	Deadman Gulch
SF210[a]	46524/46525	Willow Creek
SF211	46523	Unnamed #3 above Boulder Creek on south side
SF212	46522	Gold Hunter Gulch
SF213	46521	Unnamed #4 between Mill Creek and Gold Hunter Gulch
SF214	46539	Boulder Creek
SF215	46538	SFCDR at bridge in Mullan downstream from Boulder Creek
SF216[a]	46518	Mill Creek
SF217	dry	Unnamed #5 below Mill Creek on south side
SF218	46520	Slaughterhouse Gulch, below Morning No. 6
SF219	46510	Dry Creek
SF220	46537	SFCDR old highway bridge next to railroad
SF221	46509	Gold Creek
SF222	46508	St. Joe Creek
SF223	46507	Grouse Gulch
SF224	46506	Ruddy Gulch
SF225	46505	Rock Creek

Table 2
List of Surface Water Sampling Stations

Station No.	Sample Number	Station Location Description
SF226	46504	Trowbridge Gulch
SF227	46536	SFCDR at Golconda mill/mine dump bridge
SF228	46534/46535	SFCDR under railroad bridge
SF229	46503	Dexter Gulch
SF230	46501/46502	Watson Gulch
SF231	46533	SFCDR under I-90 above Canyon Creek confluence
SF232[a]	46554	SFCDR downtown Wallace above Nine Mile Creek
SF233	46551	SFCDR at old railroad bridge in Wallace
SF234	46350	Placer Creek at second bridge from Frontage Road
SF235	46555	SFCDR from bridge next to gas station at visitor center west end of Wallace
SF236	46439	Daly Creek 70 feet south of Frontage Road
SF237[a]	46552	SFCDR at bridge next to railroad bridge west of Wallace
SF238	46340	Lake Creek above Confluence with SFCDR
SF239[a]	46550	SFCDR at Silverton I-90 bridge
SF240	46348	Revenue Gulch 100 yards from I-90 at Silverton off-ramp
SF241[a]	46549	SFCDR upstream of Galena tailings pond from pipe bridge
SF242	46347	Argentine Gulch
SF243	uncollectable	SFCDR at Galena tailing pile bridge
SF244	46436	Shield Gulch before crossing under I-90
SF245	46343/46344	Nuckols Gulch north side at confluence with SFCDR
SF246	46345	Meyer Gulch
SF247	uncollectable	SFCDR halfway between SF-170 and NG-1
SF248	46342	Two Mile Creek 35 feet upstream of SFCDR confluence
SF249	46547/46548	Bridge at Osburn over SFCDR below Two Mile Creek
SF250[a]	46337	McFarran Gulch immediately south of I-90
SF251	46341	Jewel Gulch

Table 2
List of Surface Water Sampling Stations

Station No.	Sample Number	Station Location Description
SF252	46339	Terror Gulch 80 feet upstream of SFCDR confluence
SF253	46545	SFCDR immediately below Terror Gulch
SF254[a]	46546	SFCDR at Frontage Road bridge below little Terror Gulch
SF255	46338	Rosebud Gulch
SF256	46336	Spring Gulch
SF257[a]	46326	Polaris Gulch
SF258	uncollectable	SFCDR at roadside stop on I-90 above Big Creek
SF259	46544	SFCDR bridge above Big Creek confluence
SF260	46351	Big Creek south of Frontage Road bridge
SF261	46325	Prospect Gulch
SF262[a]	46324	Moon Creek at SFCDR confluence
SF263	uncollectable	SFCDR below Big Creek under golf course
SF264	46579	SFCDR above Gold Run Gulch confluence
SF265	46353	Gold Run Gulch
SF266	46323	Montgomery Gulch north of Frontage Road bridge
SF267	46352	Elk Creek
SF268	46543	SFCDR at Elizabeth Park USGS station
SF269[a]	dry	Unnamed #6 downstream of Elk Creek on north side
SF270	46542	Smelterville Airport Road bridge
SF271	46541	USGS station on SFCDR at railroad bridge
SF316	46519	Upstream Slaughterhouse Gulch 1; above Morning No. 6
SF317	46512/46513	Upstream Grouse Gulch 1; east tributary
SF318	46516	Upstream Grouse Gulch 2; below Star Mine
SF319	46514	Upstream Grouse Gulch 3; below West Star
SF320	46517	Upstream Grouse Gulch 4; above West Star
SF321	46515	Upstream Grouse Gulch 5; above Star Mine, west tributary

Table 2
List of Surface Water Sampling Stations

Station No.	Sample Number	Station Location Description
SF338	uncollectable	Weyer Gulch
		Canyon Creek
CC272	46569	Canyon Creek above source areas
CC273	46568	O'Neill Gulch, south side above Gorge Gulch
CC274[a]	46567	Canyon Creek below outlet for domestic water supply
CC275	inaccessible	Canyon Creek above Gorge Gulch
CC276	46574	Canyon Creek above Star Mine
CC277	46566	Canyon Creek at west side of Star Mine
CC278	46564	Canyon Creek under Highway 4 bridge
CC279	46565	Canyon Creek at Highway 4 at Tamarack Mine
CC280	46563	Canyon Creek downstream from TAM-1
CC281[a]	46562	Canyon Creek at Frisco Mine bridge
CC282	46561	Canyon Creek below Gem Mine at wooden bridge
CC283	46573	Canyon Creek above Star-Phoenix tailings ponds
CC284	46571/46572	600 ft north of Canyon Silver Tailings ponds
CC285	46559/46560	Canyon Creek between Star-Phoenix tailings ponds
CC286	46570	Canyon Creek below Star-Phoenix tailings ponds
CC287	46558	Canyon Creek at valley narrows below Woodland Park
CC288	46557	Canyon Creek at Frontage Road bridge north of I-90
CC392	46575	Gorge Gulch
		Nine Mile Creek
NM289	46377	Above Interstate-Callahan waste pile
NM290	46378	Tamarack "tributary", just below Interstate-Callahan tailings pile
NM291	46379	Wilson Creek, adjacent to ENM-5
NM292	46380	East Nine Mile Creek above Wilson Creek
NM293	46381	East Nine Mile Creek below mine tailing dump

Table 2
List of Surface Water Sampling Stations

Station No.	Sample Number	Station Location Description
NM294	46382/46383	Rex "tributary", west side between ENM-4 and ENM-3
NM295	46394/46395	500 yards upstream from old mine adit
NM296	46393	East Nine Mile Creek at mine tailing dump
NM297	46392	East Nine Mile Creek below mine dump
NM298	46387	East Nine Mile 200 yards above confluence with Nine Mile
NM299	46386	West Fork Nine Mile, at confluence with East Nine Mile
NM300	46385	West Ninemile Creek 75 yards below fish pond
NM301	46391	Nine Mile Creek at Zannetiville
NM302[a]	46390	Black Cloud Creek, before confluence with Nine Mile
NM303	46384	Nine Mile Creek above McCarthy
NM304	46389	Unidentified sampling location
NM305	46388	Nine Mile Creek south of Depot RV park
		Pine Creek
PC306	46318	East Fork Pine Creek
PC307	46312	Highland Creek at mouth
PC308[a]	46311	Denver Creek at mouth
PC309	46310	Trapper Creek
PC310[b]	46309	Pine Creek downstream of Nabob Creek
PC311	46307	West Fork
PC312	46308	West Fork Tributaries
PC313	46306	Little Pine Creek
PC314	46305	Main stem above mouth
PC315	46304	Pine Creek at mouth
PC322	46316/46315	Upstream Highland Creek 1; east tributary
PC323	46313	Upstream Highland Creek 2; Red Cloud Creek
PC324	46320	Upstream Denver Creek 1; above Little Pittsburg

Table 2
List of Surface Water Sampling Stations

Station No.	Sample Number	Station Location Description
PC325	46601	Upstream Denver Creek 2; above Sydney Mine
PC326[b]	46441	Upstream Nabob Creek 1 (duplicates fall sample location PC310)
PC327	dry	Upstream Nabob Creek 2; west tributary
PC328	dry	Upstream Nabob Creek 3; east tributary
PC329	46316	Pine Creek, above Highland Creek
PC330	46578	Pine Creek, between PC315 and PC312
		Downstream Locations
DS331	46335	SFCDR at Smelterville Bridge
DS332	46333/46334	NFCDR above confluence with SFCDR, Enaville
DS333	46328	CDR at Rt. 90 Bridge, Harrison
DS334	46327	St. Joe River at Turning Point RR Bridge
DS335	46329	Spokane River at Blackwell Island Bridge, Coeur d'Alene
DS336	46330	Spokane River at State Line
DS337	46331	Spokane River at Monroe Street Bridge, Spokane
		North Fork of the Coeur d'Alene River
NF01	46281/46282	Beaver Creek between Carpenter Gulch and NFCDR
NF02	46576	NFCDR upstream of Beaver Creek
NF03	46283	Beaver Creek downstream of Prospect Gulch
NF04	46285	Potosi Gulch upstream of Trail Creek
NF05	46286	Trail Creek between Poorman Gulch and Potosi Gulch
NF06	46284	Beaver Creek upstream of Trail Creek
NF07	46287	Pony Gulch upstream of Beaver Creek confluence
NF08	46293/46294	Deer Creek upstream of Beaver Creek confluence
NF09	46288	Beaver Creek downstream of confluence with Missoula Gulch
NF10	46295	Missoula Gulch upstream of Dobson Gulch
NF11	46296	Carbon Creek upstream of Beaver Creek confluence

Table 2
List of Surface Water Sampling Stations

Station No.	Sample Number	Station Location Description
NF12	46297	Beaver Creek upstream of Carbon Creek confluence
NF13	46577	NFCDR upstream of confluence with Prichard Creek
NF14	46405	Prichard Creek upstream of NFCDR confluence
NF15	uncollectable	Prichard Creek between NFCDR and Eagle Creek confluences
NF16	46401/46402	Eagle Creek upstream of Prichard Creek confluence
NF17	46406	West Fork Eagle Creek upstream of confluence with East Fork Eagle Creek
NF18	46403	Fancy Gulch upstream of East Fork Eagle Creek confluence
NF19	46407	Cottonwood Creek upstream of confluence with West Fork Eagle Creek
NF20	46408	Cottonwood Creek, 0.1 mile upstream of confluence with West Fork Eagle Creek
NF21	46289	Tributary above East Fork Eagle Creek downstream of Jack Waite Mine
NF22	46290	Tributary above East Fork Eagle Creek upstream of Jack Waite Mine
NF23	46418	Prichard Creek upstream of confluence with Eagle Creek
NF24	46410	Prichard Creek upstream of confluence with Accident Gulch
NF25	46409	Prichard Creek downstream of confluence with Tiger Gulch
NF26	46411	Cougar Gulch upstream of confluence with Prichard Creek
NF27	46419	Prichard Creek upstream of confluence with Cougar Gulch
NF28	46412	Wesp Gulch upstream of confluence with Prichard Creek
NF29	46420	Prichard Creek upstream of confluence with Wesp Gulch
NF30	46413/46414	Butte Gulch upstream of confluence with Prichard Creek
NF31	46421	Prichard Creek upstream of confluence with Butte Gulch
NF32	46415	Bear Gulch upstream of confluence with Prichard Creek
NF33	46422	Prichard Creek upstream of confluence with Bear Gulch; downstream of Vendetta/Moonshine Gulch
NF34	46423	Vendetta Gulch upstream of confluence with Prichard Creek
NF35	46424	Moonshine Gulch upstream of confluence with Prichard Creek
NF36	46416	Prichard Creek downstream of confluence with Cement Gulch

Table 2
List of Surface Water Sampling Stations

Station No.	Sample Number	Station Location Description
NF37	46427	Paragon Gulch upstream of confluence with Prichard Creek
NF38	46425/46426	Prichard Creek upstream of confluence with Paragon Gulch; downstream of Sullivan Gulch
NF39	dry	Tributary off of Bear Gulch; below Orofino Mine
NF40	dry	Tributary off of Bear Gulch; below Bear Top Mine
NF41	46417	Prichard Creek "opportunistic" sample - pond 1
NF42	46428	Prichard Creek "opportunistic" sample - pond 2
NF43	46429	Prichard Creek "opportunistic" sample - pond 3
NF44	46430	Prichard Creek "opportunistic" sample - pond 4
NF45	46431	Prichard Creek "opportunistic" sample - pond 5
NF46	46432	Prichard Creek "opportunistic" sample - pond 6
NF47	46433	Prichard Creek "opportunistic" sample - pond 7
NF48	46442	Tributary above East Fork Eagle Creek downstream of tailings pile
NF49	46443	Tributary above East Fork Eagle Creek upstream of tailings pile

[a] - High flow sample location different from the low flow sample location
[b] - Sample location incorrectly collected on Pine Creek, sample location

Alteration: Four sampling stations on the SFCDR were not occupied due to the high surface water flow. Additionally, due to the high flow conditions several of the sampling stations had to be moved up or downstream of the location sampled in the fall. These adjusted locations are footnoted on Table 2. Three sampling stations on the SFCDR tributaries were not sampled because the stream beds were dry. During low flow sampling, Weyer Gulch was sampled instead of the SFCDR at station SF231. During the high flow field effort, the sampling team collected SF231 on the SFCDR and attempted to collect a sample at Weyer Gulch, which was not possible due to the high flow conditions. Weyer Gulch was not included in the original field sampling plan. One station on Canyon Creek was not sampled because the site was inaccessible. Two stations on Pine Creek were not sampled because the stream beds were dry. One station on the NFCDR was uncollectable and two stations were dry. However, two stations were added to the NFCDR sampling effort while field activities were underway.

3. ADIT DRAINAGE AND SEEP SURFACE WATER SAMPLING

Original plan: Surface water samples were originally scheduled to be collected from 79 priority one adit/seep sites within the SFCDR basin. The priority one sites were limited to those that were known producers or had high flows. The remaining 83 adit/seep sites were determined to be non-producers or known to be dry and were not included in this sampling effort. Table 3 summarizes the planned and actual samples collected for this field effort.

Table 3
Summary of Adit/Seep Surface Water Samples

Adit/Seep Samples	Upper SFCDR	Canyon Creek	Nine Mile Creek	Lower SFCDR	Pine Creek
Planned	17	18	21	9	14
Actual	12	6	8	2	11

Alteration: The 5 adit/seep sites along the upper SFCDR were either caved in, dry, piped to another location, or unable to be accessed. Twelve of the priority one adit/seep sites on Canyon Creek were dry, buried, inaccessible, or unable to be located. Thirteen of the Nine Mile Creek adit/seep sites were dry, collapsed, inaccessible, or unable to be located. Seven adit/seep sites along the lower SFCDR were either inaccessible, dry, or piped to permitted tailings ponds. Three of the Pine Creek adit/seep sites were either dry or unable to be located. Table 4 provides a list of the 79 priority one adit/seep water sampling stations that were sampled during this field effort. Three additional non-priority one adit/seep sites were sampled during this effort.

Table 4
List of Priority One Adit/Seep Sampling Stations

Adit/Seep Name	Sample Number
Upper SFCDR	
Snowstorm No. 3	46588
Idaho Silver	caved in/dry
National Mine	piped to unknown location
Copper King	46440
Reindeer Queen	unable to access
Atlas	46589
Goldhunter No. 6	caved in/dry
Morning No. 4	46581
Morning No. 5	46580
Morning No. 6	46585
Morning No. 6 waste rock pile	46586
Star 1200 Level	46582/46583
We-Like	caved in/dry
Grouse	46584
Alice	46590
Square Deal	46593
Golconda	46591
Canyon Creek	
Ajax No. 3	unable to locate
Ajax No. 3 waste rock	unable to locate
Marsh No. 1	unable to access
Marsh No. 2	unable to access
Hercules No. 3	dry
Hercules No. 3 waste rock pile	unable to locate
Hercules No. 4	dry
Hercules No. 5	46299
Hidden Treasure	46302/46303

Table 4
List of Priority One Adit/Seep Sampling Stations

Adit/Seep Name	Sample Number
Hecla No. 3/Star Tunnel	inaccessible
Sherman 1500 Level	dry
Oreano Adit (Sherman)	dry
Campbell Adit (Standard-Mammoth)	buried
Tamarack No. 7	46298
Gem No. 3	46301
Canyon Silver-Formosa	46438
Star Pond area	dry
Woodland Park area	46439
Nine Mile Creek - East Fork Ninemile Creek	
Interstate-Callahan No. 4	46376
Interstate-Callahan waste rock	46375
Interstate-Callahan tailings	unable to locate
Tamarack 400 Level	46399
Tamarack No. 1	unable to locate
Tamarack No. 2	unable to locate
Tamarack No. 3	unable to locate
Tamarack No. 4	dry
Tamarack No. 5	46396
Tamarack waste rock	unable to locate
Rex No. 1	collapsed/dry
Rex No. 2	46374
Rex tailings	46373
Success No. 3	46470
Success tailings	46472
Main Stem Ninemile Creek	
Dayrock Main Level	inaccessible (gate and no trespass sign)
Dayrock 100	inaccessible (gate and no trespass sign)

Table 4
List of Priority One Adit/Seep Sampling Stations

Adit/Seep Name	Sample Number
California	dry
Monarch	dry
Ruth	dry
Duluth	dry
Lower SFCDR	
Western Union (lower adit)	46437
Western Union (upper adit)	inaccessible
Osburn Flats	dry
Argentine	dry
Rainbow	piped to permitted tailings pond
Coeur d'Alene (Mineral Point)	dry
Evolution	dry
Silver Summit/Con Silver	dry
Polaris	46300
Pine Creek - East Fork Pine Creek	
Upper Constitution	46356/46357
Lower Constitution	dry
Douglas	dry
Highland Surprise	46358
Highland-Surprise waste rock pile	46366
Nevada-Stewart	46359
Sidney (Red Cloud Ck. Adit)	46360
Sidney Mill and Adit	unable to locate
Upper Little Pittsburg	46363
Lower Little Pittsburg	46364
Nabob (1300 Level)	46365
Lookout Mountain	46354

Table 4
List of Priority One Adit/Seep Sampling Stations

Adit/Seep Name	Sample Number
Main Stem Pine Creek	
Liberal King	46367
Amy	46371/46372
Non-Priority One Adits/Seeps	
Adit upstream of Little Pittsburg	46362
Amy North	46368
Tamarack No. 5 seep	46397

4. USGS COORDINATION

Original plan: Completion of the high flow sampling event was originally scheduled to be coordinated with field sampling teams from the USGS. The original intent was for the USGS crew to sample at nine specific stations within the SFCDR basin throughout the high flow peak event (anticipated six samples at each station, 54 total samples).

Alteration: During this 2.5 week field sampling effort, a high flow peak event did not occur. As a result, the USGS collected one sample from each of the USGS identified stations (total of nine samples) within the SFCDR basin (see Table 5):

Table 5
Summary of USGS Surface Water Samples

USGS Sampling Location	Nearest URSG Sampling Station	Sample No.
SFCDR above Deadman Gulch	SF209	46648
Canyon Creek at Wallace	CC288	46641
Nine Mile Creek at Wallace	NM305	46642
SFCDR at Placer Creek at Wallace	SF234	46643
SFCDR below Terror Gulch at Osburn	SF253	46644
SFCDR at Elizabeth Park	SF268	46647
Pine Creek at Pinehurst	PC315	46645
SFCDR at Pinehurst	SF271	46646
NFCDR at Enaville	DS332	46649

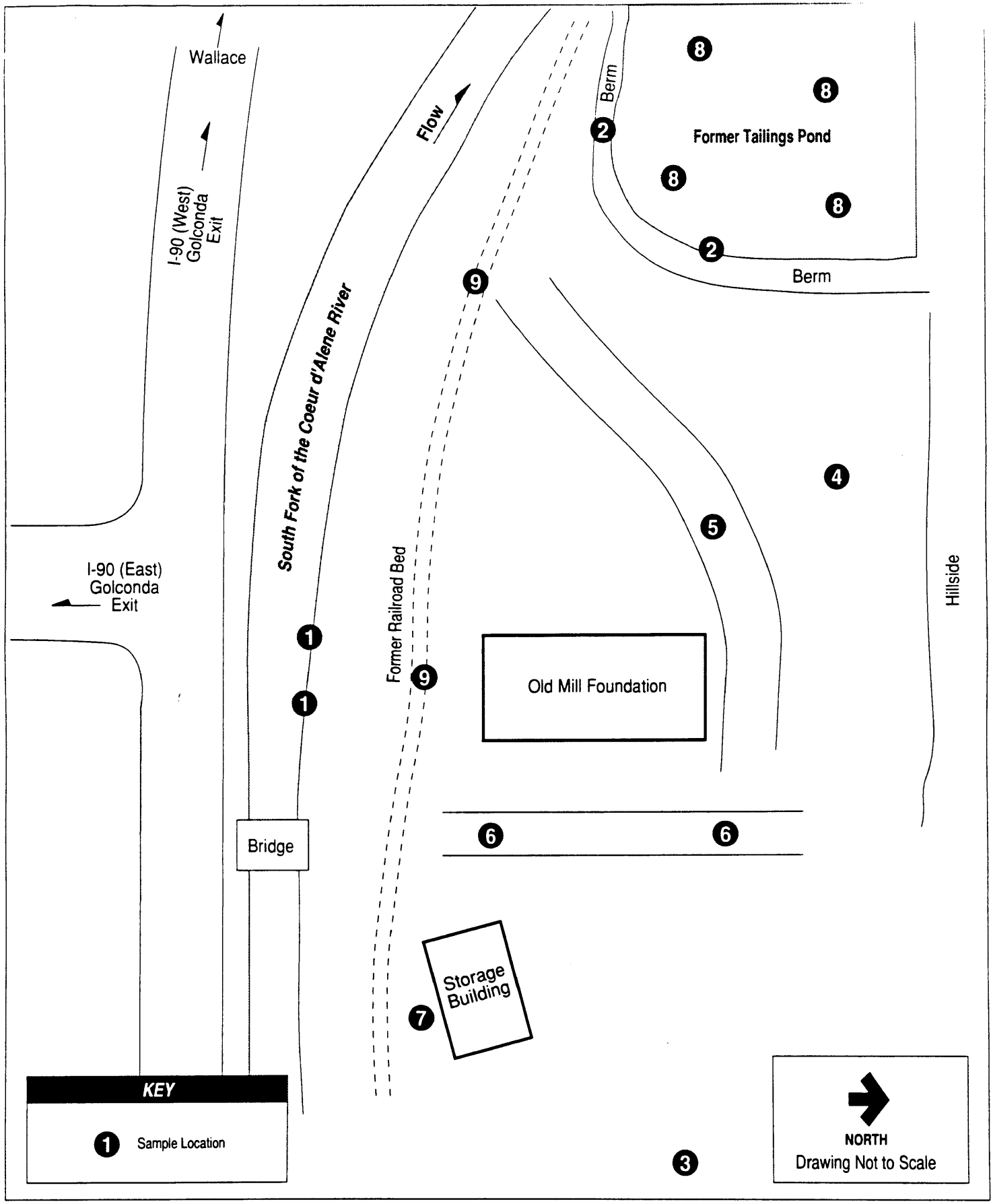
5. SOIL SAMPLING AT THE GOLCONDA MINE SITE

Original plan: Sampling activities at the Golconda Mine site were not identified in the original field sampling plan or in the first field sampling plan alteration.

Alteration: Soil samples were collected from 9 areas at the Golconda Mine site. Figure 1 shows a general sketch of the Golconda Mine site and the locations where samples were collected, some were composite sampling sites. The sample stations are identified on the figure as listed in Table 6.

Table 6
Golconda Sample Location Descriptions

Sample Station	Description
1	Stream - vertical composite from two locations along the river bank, composite collected from water level to top of the stream bank
2	Berm - vertical composite from two locations along the berm surrounding the former tailings pond, composite collected from a 3 foot cut into the berm at a depth of approximately 3 inches
3	East - single soil sample collected from an area on the east end of the site, samples collected from three depths: 0-6", 6-12", and 12-18" below grade
4	North - single soil sample collected from an area on the north end of the site just east of the tailings pond berm, samples collected from three depths: 0-6", 6-12", and 12-18" below grade
5	Road West - single soil sample collected from the road bed along the west side of the site, samples collected from three depths: 0-6", 6-12", and 12-18" below grade
6	Road East - soil sample collected from two locations in the road bed along the east side of the site, samples composited from three depths: 0-6", 6-12", and 12-18" below grade
7	Storage - single soil sample collected just south of the storage building on the east end of the site, samples collected from three depths: 0-6", 6-12", and 12-18" below grade
8	Tailings Pond - soil sample composited from four locations within the area identified as the former tailings pond, samples composited from four depths: 0-1", 1-6", 6-12", and 12-18" below grade
9	Railroad - soil sample composited from the former railroad bed that runs along the south side of the site, samples collected from three depths: 0-6", 6-12", and 12-18" below grade



URS Greiner	Figure 1 Golconda Mine Site Sample Location Map	Bunker Hill Facility Coeur d'Alene Basin FIELD SAMPLING PLAN ALTERATION 02

416250050-1-060398

Erratum for
Field Sampling Plan Alteration No. 2 for
FSPA No. 4

ERRATUM FOR FSPA NO. 4 ALTERATION 2 REPORT

Several deviations were identified to the *Field Sampling Plan Alterations for the Adit Drainage, Seep, and Creek Surface Water Sampling; Spring 1998 High Flow Event* dated June 5, 1998. The following is a list of the deviations found:

- In Table 1, the number of planned samples indicated for the SFCDR Main Stem, the SFCDR tributaries, and Canyon Creek is wrong. Twenty-five samples were planned for the SFCDR Main Stem, 52 samples were planned for the SFCDR tributaries, and 17 samples were planned for Canyon Creek.

- In Table 2, the sample number 46533 for SF231 is wrong. The correct number is 46553.

- In Table 2, the sample number 46316/46315 for PC322 is wrong. The correct number is 46314/46315.

- In Table 2, the sample number 46295 for NF10 is wrong. The correct number is 46297.

- In Table 2, the sample number 46296 for NF11 is wrong. The correct number is 46295.

- In Table 2, the sample number 46297 for NF12 is wrong. The correct number is 46296.

- In Table 2, the information on locations that changed during the high flow sampling (FSPA No. 4) compared to the low flow sampling (FSPA No. 2) is incomplete and incorrect for certain locations. The following explains the changes in locations between the two sampling events:

    1. The location of sampling stations SF216, SF231, SF232, SF237, SF241, CC272, CC274, CC280, and PC310 were significantly different during FSPA No. 4 as compared to FSPA No. 2. The change in location was not reported in the alteration report for three of these; SF231, CC272, and CC280. Because the locations were significantly different during FSPA

No. 4, these stations were assigned a new location ID (see attached Table 1).

2. During FSPA No. 2, PC329 and PC330 were added during field activities. The Amy-Matchless Millsite: North Amy was sampled as PC329 and the Amy-Matchless Millsite: Amy was sampled as PC330. The personnel writing the field sampling plan for addendum 4 were not aware of this, and used PC329 and PC330 for planned sampling locations on the East Fork of Pine Creek and Pine Creek, respectively. Since PC329 and PC330 had already been used for adit/seep locations at the Amy-Matchless Millsite, new location IDs were required for the East Fork Pine Creek and Pine Creek sampling locations. Therefore, these locations were reassigned to PC338 and PC339 (see attached Table 1).

3. The location of sampling stations SF210, SF239, SF254, SF257, SF262, SF269, CC281, NM302, and PC308 were slightly different during FSPA No. 4 as compared to FSPA No. 2. However, since the change was not significant, these stations were not assigned a new location ID.

4. The alteration report indicated that the location of SF250 changed during FSPA No. 4 as compared to FSPA No. 2. However, no samples were obtained at this station during FSPA No. 2. Therefore, the location could not have changed.

5. The alteration report indicated that the PC326 location was incorrectly obtained at Pine Creek. However, the field map drawn on the Surface Water Sampling Record shows the sampling location on Nabob Creek, as planned.

- In Table 2, the station location descriptions for CC273, CC274, and CC275 are mixed up. CC273 should read Canyon Creek below outlet for domestic water supply, CC274 should read Canyon Creek above Gorge Gulch, and CC275 should read O'Neill Gulch, south side above Gorge Gulch.

- The actual number of samples collected differs from the numbers shown in Table 3. Nine samples were collected along Nine Mile Creek and 14 samples were collected along Pine Creek.

- In Section 2, the alteration paragraph should include the following statement "One station on Canyon Creek (CC275) was added during field activities."

- In section 3, the description of the alteration to the adit drainage and seep surface water sampling is inaccurate and should be entirely replaced by the following description: "For this sampling event, sampling was attempted at the priority 1 sites and one priority 2 site. The remaining 81 adit/seep sites were determined to be non-producers or known to be dry and were not included in this sampling event. Four adit/seep sites along the upper SFCDAR were either caved in, dry, piped to another location, or could not be accessed. One adit along the upper South Fork was not sampled because it could not be found (Goldhunter No. 6). Twelve of the adit/seep sites along Canyon Creek were dry, buried, inaccessible, or could not be located. Ten of the adit/seep sites along Nine Mile Creek were dry or had insufficient flow, were inaccessible, or could not be located. Two of the adit/seep sites along Nine Mile creek (Ruth Mine and Monarch Mine Blackcloud Ck.) were not visited, because the field crew visited the wrong area. The field crew visited three mines (McDonald Mine, Black Cloud No. 3, and Marshal No. 1) instead of the Ruth Mine and the Monarch Mine Blackcloud Ck. Six adit/seep sites along the lower SFCDAR were either dry, piped to permitted tailings ponds, or could not be located. One adit, Argentine Mine, was not sampled because the wrong adit, Vulcan Mine, was visited. A sample was not obtained because the Vulcan Mine adit was dry. In addition, the Silver Dollar Mine was sampled instead of the Polaris Mine because all drainage from the Polaris flows out of the Silver Dollar Mine. Three of the Pine Creek adit/seep sites were either dry or could not be located. Therefore, these sites could not be sampled. Two adits/seeps which had not been identified in the field sampling plan were sampled. These are the adit upstream of Little Pittsburg (Little Pittsburg: Adit Upstream) and Amy-Matchless: North Amy, both of which are along Pine Creek. In addition, one priority two site along Pine Creek was sampled (Shetland Mining Co.-Nabob Silver-Lead)."

- According to Table 4, a sample was not obtained at Goldhunter No. 6 because it was caved in and dry. During FSPA No. 2, a sample was not obtained because HECLA staff indicated that drainage is piped to a permitted tailings pond. This discrepancy was resolved by speaking with the field crew members. The field crew could not find the adit during FSPA No. 4. They assumed it was collapsed because they could not find it, and they assumed it had no drainage because the hillside was dry.

- According to Table 4, the Marsh No. 1 and No. 2 adits were not sampled because these adits were inaccessible. However, no record of this was found in the field notes. It appears that these adits were not visited.

- According to Table 4, sampling at the Interstate-Callahan tailings seep did not occur because it could not be located. However, a new location described as the Tamarack No. 5 seep is sampled. These two location names refer to the same source.

- According to Table 4, the Ruth and Monarch Mines were not sampled because they were dry. However, field crews did not visit these mines because they went to the wrong area. They visited the McDonald Mine, Black Cloud No. 3, and Marshal No. 1 instead. These three mines were not sampled because they were dry.

- According to Table 4, Duluth was not sampled because it was dry. The field notes indicate that there was a slight seepage from the adit, but it was not sampled.

- The Western Union (upper adit) was not sampled because it was inaccessible according to Table 4. The field notes indicate that this adit was not sampled because it could not be located.

- According to Table 4, the Argentine Mine was not sampled because it was dry. However, it was later determined that field crews had actually visited the Vulcan Mine instead of the Argentine Mine. Therefore, the Vulcan Mine is the one that was found to be dry.

- According to Table 4, the Silver Summit/Con Silver adit was not sampled because it was dry. The field notes indicate that this adit was not sampled because it discharges to a permitted tailings pond.

- According to Table 4, the Polaris adit was sampled. However, according to the field notes, the Silver Dollar Mine adit was sampled. The Polaris Mine is connected to the Silver Dollar Mine via a shaft. All drainage from Polaris flows out of the Silver Dollar Mine.

- In Table 4, one adit sampling location that was added in the field was accidentally left out. This is the Shetland Mining Company – Nabob Silver-Lead (referred to as the Upper Lynch in the FSPA No. 4 documentation), which is a priority 2 adit. The field sampling number for this sampling location is 46355.

- In Table 6, the location descriptions for many of the Golconda soil samples are incomplete and therefore misleading. The following provides updated descriptions, which will clarify the number of samples and the method used for compositing samples:

  1. Golconda1 - One soil sample was collected from the river bank (Golconda1). A vertical composite was collected from the water level to the top of the stream bank at two river bank locations. Soil from these two locations was then composited into one Golconda1 soil sample.

  2. Golconda2 - One soil sample was collected from the tailings pond berm (Golconda2). Soil was collected from two locations within the berm in a 3-foot cut at a depth of approximately 3 inches. The soil from the two locations was then composited into one Golconda2 soil sample.

  3. Golconda3 - Three soil samples were collected from an area east of the site (Golconda3). Each sample was collected from a different depth at the Golconda3 location: 0-6 inches, 6-12 inches, and 12-18 inches.

  4. Golconda4 - Three soil samples were collected from an area on the north end of the site just east of the tailings pond berm (Golconda4). Each sample was collected from a different depth at the Golconda4 location: 0-6 inches, 6-12 inches, and 12-18 inches.

  5. Golconda5 - Three soil samples were collected from the road bed along the west side of the site (Golconda5). Each sample was collected from a different depth at the Golconda5 location: 0-6 inches, 6-12 inches, and 12-18 inches.

  6. Golconda6 - Three soil samples were collected from the road bed along the east side of the site (Golconda6). Soil was collected from three depths: 0-6 inches, 6-12 inches, 12-18 inches from two locations. Soil collected from the same depth at the two locations was then composited for a total

of three samples from the Golconda6 sampling location. (For example, the soil from 0-6 inches from the two locations was composited.)

7. Golconda7 - Three soil samples were collected just south of the storage building on the east side of the site (Golconda7). Each sample was collected from a different depth at the Golconda7 location: 0-6 inches, 6-12 inches, and 12-18 inches.

8. Golconda8 - Four soil samples were collected from tailings pond (Golconda8). Soil was collected from four depths: 0-1 inch, 1-6 inches, 6-12 inches, 12-18 inches from four locations. Soil collected from the same depth at the four locations was then composited for a total of four samples from the Golconda8 sampling location. (For example, the soil from 0-1 inch from the four locations was composited.)

9. Golconda9 - Three soil samples were collected from the former railroad bed that runs along the south side of the site (Golconda9). Soil was collected from three depths: 0-6 inches, 6-12 inches, 12-18 inches from two locations. Soil collected from the same depth at the two locations was then composited for a total of three samples from the Golconda9 sampling location. (For example, the soil from 0-6 inches from the two locations was composited.)

Table 1
Site ID and Location ID Modifications

Old Designation		New Designation		
Site ID	Location ID	Site ID	Location ID	Reason for Change
SF	216	SF	275	Different sampling location during FSPA No. 4 compared to FSPA No. 2.
SF	231	SF	398	During low flow sampling (FSPA No. 2), the sample obtained from Weyer Gulch was assigned the site/location ID SF231, even though SF231 was originally planned to be taken on the South Fork in FSPA No. 2. Therefore, SF231 became the Weyer Gulch sampling location. A new number (SF398) was needed for the planned South Fork sampling location.
SF	232	SF	273	Different sampling location during FSPA No. 4 compared to FSPA No. 2.
SF	237	SF	274	Different sampling location during FSPA No. 4 compared to FSPA No. 2.
SF	241	SF	272	Different sampling location during FSPA No. 4 compared to FSPA No. 2.
CC	272	CC	289	Different sampling location during FSPA No. 4 compared to FSPA No. 2.
CC	274	CC	290	Different sampling location during FSPA No. 4 compared to FSPA No. 2.
CC	280	CC	291	Different sampling location during FSPA No. 4 compared to FSPA No. 2.
PC	310	PC	360	During the high flow sampling event (FSPA No. 4), Pine Creek downstream of Nabob Creek was accidentally sampled instead of Nabob Creek. The sampling location of Nabob Creek is PC310, therefore, a new location id was needed for the Pine Creek sampling location.
PC	329	PC	338	During low flow sampling (FSPA No. 2), the Amy North seep was given the location ID PC329. Therefore, the sampling point on Pine Creek above Highland Creek needed a new number. (Note: This location was not sampled during FSPA No. 2.)
PC	330	PC	339	During low flow sampling (FSPA No. 2), the Amy-Matchless adit discharge was given the location ID PC330. Therefore, the sampling point on Pine Creek planned during FSPA No. 4 needed a new number. (Note: This location was not sampled during FSPA No. 2.)

Erratum for FSPA No. 5

CH2M HILL
777 108th Avenue NE
Bellevue, WA
98004-5118
Mailing address:
P.O. Box 91500
Bellevue, WA
98009-2050
Tel 425.453.5000
Fax 425.462.5957

CH2MHILL

August 14, 1998

141598.04.02

4162500.28.56
05.B
K.H.R.T. HB

Recipients of the Field Sampling Plan Addendum 05

Subject: Field Sampling Plan Addendum 05 Errata

Dear Recipients:

The enclosed pages were omitted or were corrected from the original document. Please insert the new pages. Site 62 should be removed.

Sincerely,

CH2M HILL

Debra R. Steventon

Debra R. Steventon
Administrative Assistant

Enclosures

SEA/SIMBA\USERS\DSTEVENT\CDA\CDAERRATA.DOC

TABLE 5
Anticipated Data Analyses, Rationale, and Methods

Matrix	Analyses	Study Rationale	Target Detection Limit (a)	Analytical Method
Sediment	Total antimony, arsenic, cadmium, copper, lead, mercury, and zinc	Quantitatively assess concentrations of inorganics of concern in CUAs beach sediment	Antimony 3.0 mg/kg Arsenic 0.038 mg/kg Cadmium 3.7 mg/kg Copper 280 mg/kg Lead 40.0 mg/kg Mercury 2.2 mg/kg Zinc 2,200 mg/kg	CLP
Soil	Total antimony, arsenic, cadmium, copper, lead, mercury, and zinc	Quantitatively assess concentrations of inorganics of concern in upland CUAs soil	Antimony 3.0 mg/kg Arsenic 0.038 mg/kg Cadmium 3.7 mg/kg Copper 280 mg/kg Lead 40.0 mg/kg Mercury 2.2 mg/kg Zinc 2,200 mg/kg	CLP
Surface Water	Total antimony, arsenic, cadmium, copper, lead, mercury, zinc and calcium, magnesium	Quantitatively assess surface water for presence and/or absence of total metals of concern to human health	Antimony 1.5 µg/l Arsenic 0.0045 µg/l Cadmium 1.8 µg/l Copper 140 µg/l Lead 1.5 µg/l Mercury 1.1 µg/l Zinc 1,100 µg/l Calcium 1.0 mg/l Magnesium 1.0 mg/l	CLP
	Hardness (calculated), conductivity, and pH	Quantitatively assess existing surface water environment to evaluate interaction with potential metals of interest		Field Instrument
Drinking Water (wells)	Total antimony, arsenic, cadmium, copper, lead, mercury, zinc and calcium, magnesium	Quantitatively assess well water used for drinking at remote common use areas for presence and/or absence of total metals of concern to human health	Antimony 1.5 µg/l Arsenic 0.0045 µg/l Cadmium 1.8 µg/l Copper 140 µg/l Lead 1.5 µg/l Mercury 1.1 µg/l Zinc 1,100 µg/l	CLP
	Hardness (calculated), conductivity, and pH	Quantitatively assess well water to evaluate interaction with potential metals of interest		Field Instrument

(a) Target detection limits for arsenic, cadmium, and zinc are EPA Region 9 residential PRGs (which correspond to a cancer risk of 1E-06 or a hazard quotient of 1) multiplied by 10 percent. Target detection limit for lead in soil and sediment is based $1/10^{th}$ of EPA's soil guidance value (OSWER 9355.4-12). Target detection limit for lead in water matrix is $1/10^{th}$ the EOA Action Level (EPA October 1996. Target detection limits for antimony, arsenic, lead, and mercury in water, and arsenic in soil and sediment may not be achievable. The laboratory will achieve the lowest detection limit possible for these constituents.

TABLE 6
Data Quality Objectives

Analyte/Parameter	Target Detection Limit Risk-based (a)	Background (b)	CRDL (c)	Accuracy	Precision (percent)	Target Completeness (percent)
Soil and Sediment Matrices						
Metals mg/kg						
Antimony	3.0	1.1	20 mg/kg	CLP (d)	CLP	90
Arsenic	0.038	40	5 mg/kg	CLP	CLP	90
Cadmium	3.7	0.8	10 mg/kg	CLP	CLP	90
Copper	280	---	40 mg/kg	CLP	CLP	90
Lead	40	43	10 mg/kg	CLP	CLP	90
Mercury	2.2	0.1	0.3 mg/kg	CLP	CLP	90
Zinc	2,200	95	10 mg/kg	CLP	CLP	90
Aqueous Matrices						
Metals µg/L						
Antimony	1.5	---	2	CLP	CLP	90
Arsenic	0.0045	1.5	2	CLP	CLP	90
Cadmium	1.8	6	1	CLP	CLP	90
Copper	140	---	5	CLP	CLP	90
Lead	1.5	8.5	2	CLP	CLP	90
Mercury	1.1	~0	0.2	CLP	CLP	90
Zinc	1,100	816	5	CLP	CLP	90
Calcium	1,000	---	500	CLP	CLP	90
Magnesium	1,000	---	500	CLP	CLP	90
Field Parameters						
PH	N/A	N/A	NA	± 0.1 pH	NA	NA
Specific conductance	N/A	N/A	NA	± 10 µmhos/cm	NA	NA

Notes:
µg/L - micrograms per liter
µmhos/cm – micromhos per centimeter
mg/L – milligrams per liter
mg/kg – milligrams per kilogram

(a) Risk-based target detection limits for arsenic, cadmium, and zinc are EPA Region 9 residential PRGs (which correspond to a cancer risk of 1E-06 or a hazard quotient of 1) multiplied by 10 percent. Target detection limit for lead in soil and sediment is based $1/10^{th}$ of EPA's soil guidance value (OSWER 9355.4-12. Target detection limit for lead in water matrix is $1/10^{th}$ the EOA Action Level (EPA October 1996.

(b) Background concentrations on: soil/sediment-Gott, G.B. and J.B. Cathrall 1980; water-Parliman et al. 1980.

(c) For soil and sediment, the laboratory should provide instrument detection limits for results that are less than CRDLs.

(d) EPA CLP Statement of Work ILM 4-0.

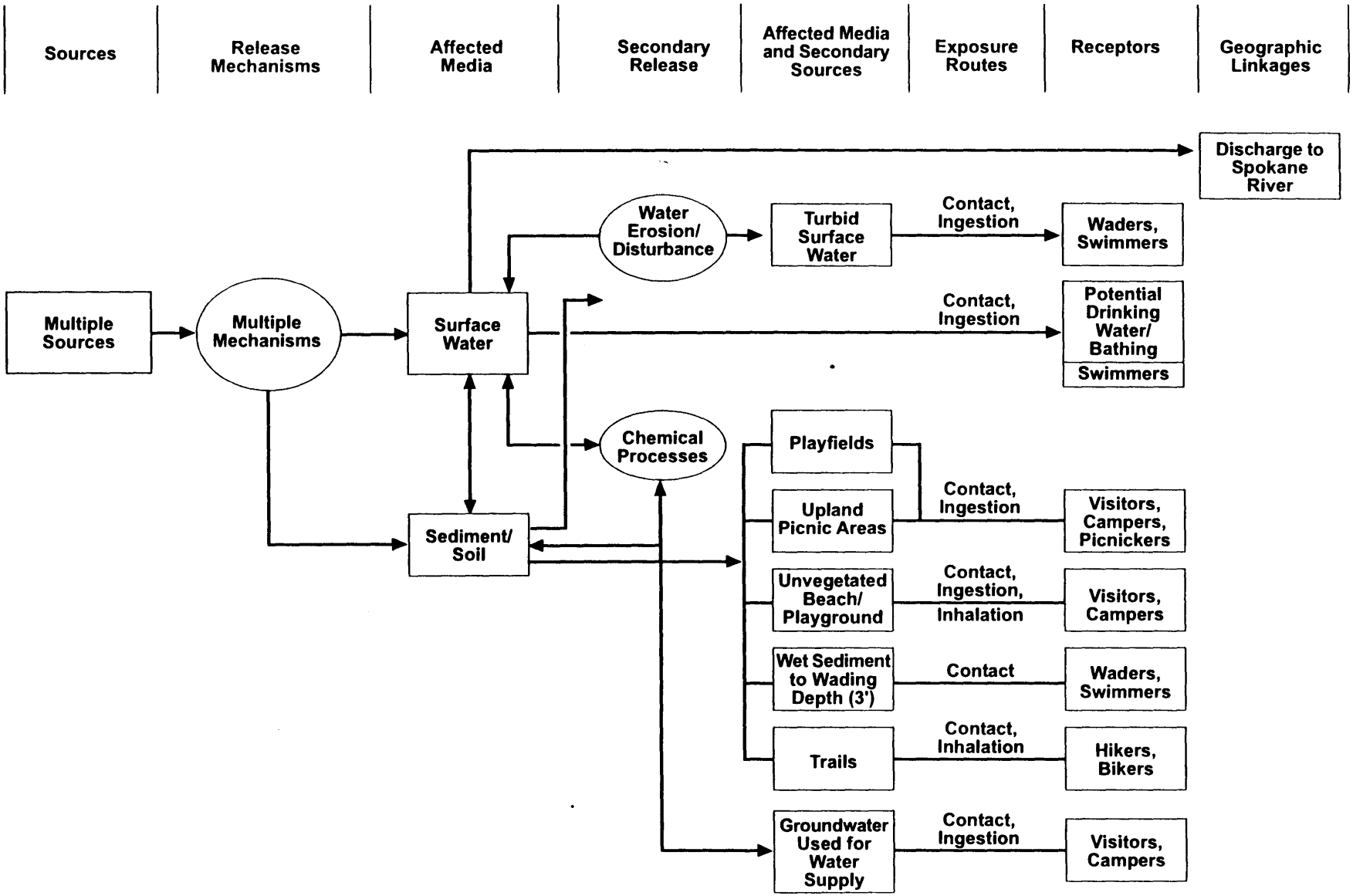


Figure 1. **Coeur d'Alene Basin Preliminary CSM Process Model General Common Use Areas**

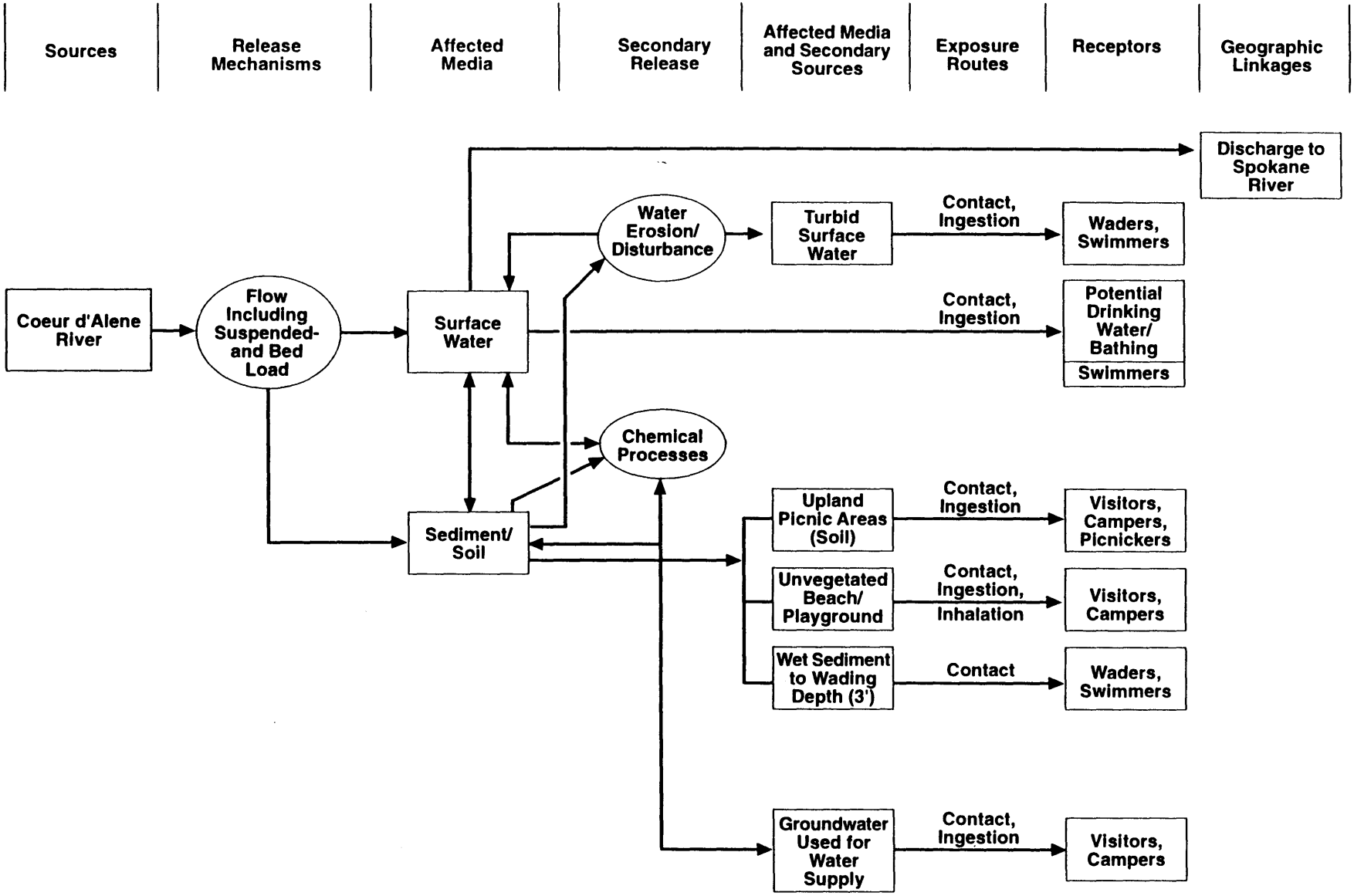
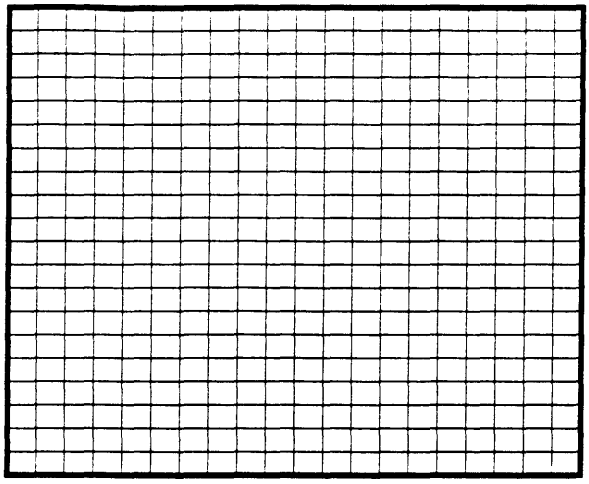
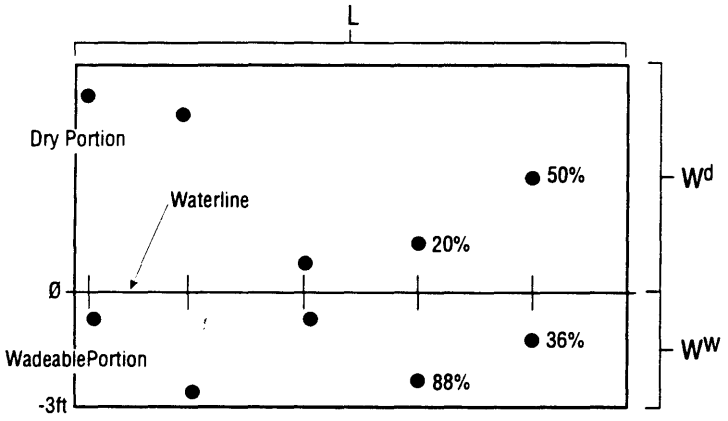


Figure 2. **Coeur d'Alene Basin Preliminary CSM Process Model Recreational Beaches**



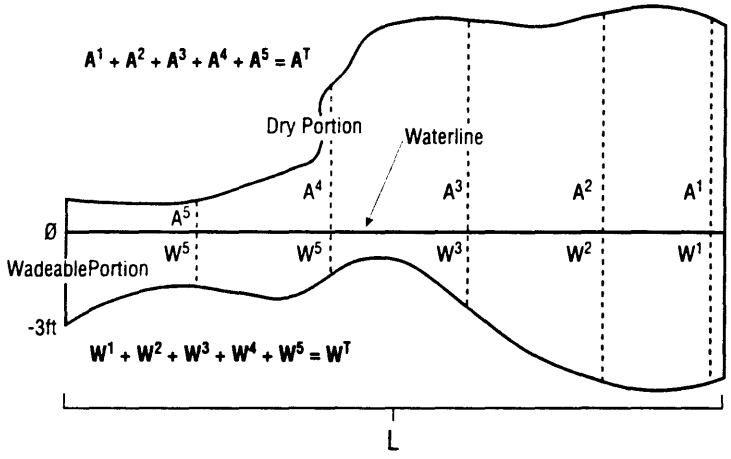
A. Upland Site - Regularly Shaped Area

1. Apply grid starting at a randomly selected start point



B. Beach Sites - Regularly Shaped Area

1. Measure length of area (L).
2. Divide into number of sample points (5 or 7) starting at a randoming selected start point.
3. Measure width of dry and wadeable portions (W).
4. Randomly sample at point along wadeable width and dry width based on percent of width (see example).



C. Beach or Upland Site - Irregularly Shaped Area

1. Measure length of sample area (L).
2. Divide "L" into number of sample points (5 or 7) starting at a randomly selected point.
3. Cumulatively measure transects off nodes.
4. Randomly select sample points along total length of transects.

Figure 3. **Coeur d'Alene Basin Sample Point Location Determinations**

Bunker Hill Basin-Wide RI/FS FSP and QAPP Addenda
Common Use Area Site Summary

General Area of Site Lake Coeur d'Alene

SiteID: 15 **Site Name:** Higgan's Point (site 1)

USGSQuad: Fernan Lake **County:** Kootenai **T:** 49N **R:** 03W **S:** 02

Shoreline Jurisdiction State of Idaho, Lands Department **Other Jurisdiction(s):** State of Idaho, Parks and Recreation Department

COMMENT: On list; not visited during field recon. Similar to Sanders Beach, so assumed same sampling requirements.

SHORELINE USES AND FEATURES

Beach play; dry	☑	Shoreline Type Sand	
Beach play; wet	☑	Shore Line Pitch	
Swimming	☐	AboveWaterLine: Moderate	
Fishing ponds/piers	☐	BelowWaterLine: Moderate	
Boat docks/ramps	☐		

UPLAND USES AND FEATURES

Park	☐	General gathering place	☐
School	☐	Campground	☐
Playfield	☐	Picnic areas	☐
Playground; digging	☐	Recreational trails	☐
Playground; non-digging	☐	Elevation Within flood plain	
Drinking Water None		Comment re: elevation Assumed all sampling within flood plain.	

SAMPLES

Dry Beach	Wet Beach	Turbid SW	Uplnd (0-1")	Uplnd (1-6")	Upland (6-12")	Upland (12-18")	Upland (18-24")	DW Sample
7	7	7						

PHOTOS

SiteID: 15 **PhotoID:** **PhotoDate:**

PhotoCmt:

Bunker Hill Basin-Wide RI/FS FSP and QAPP Addenda
Common Use Area Site Summary

General Area of Site Lake Coeur d'Alene

SiteID: 16 **Site Name:** Higgan's Point (site 2)

USGSQuad: Fernan Lake **County:** Kootenai **T:** 49N **R:** 03W **S:** 02

Shoreline Jurisdiction State of Idaho, Lands Department **Other Jurisdiction(s):** State of Idaho, Parks and Recreation Department

COMMENT: On list; not visited during field recon. Similar to Sanders Beach, so assumed same sampling requirements.

SHORELINE USES AND FEATURES

Beach play; dry	☑	Shoreline Type Sand	
Beach play; wet	☑	Shore Line Pitch	
Swimming	☐	AboveWaterLine: Moderate	
Fishing ponds/piers	☐	BelowWaterLine: Moderate	
Boat docks/ramps	☐		

UPLAND USES AND FEATURES

Park	☐	General gathering place	☐
School	☐	Campground	☐
Playfield	☐	Picnic areas	☐
Playground; digging	☐	Recreational trails	☐
Playground; non-digging	☐	Elevation Not applicable	
Drinking Water		Comment re: elevation	
None		Assumed all sampling areas within flood plain	

SAMPLES

Dry Beach	Wet Beach	Turbid SW	Uplnd (0-1")	Uplnd (1-6")	Upland (6-12")	Upland (12-18")	Upland (18-24")	DW Sample
7	7	7						

PHOTOS

SiteID: 16 **PhotoID:** **PhotoDate:**

PhotoCmt:

Bunker Hill Basin-Wide RI/FS FSP and QAPP Addenda
Common Use Area Site Summary

General Area of Site Lake Coeur d'Alene

SiteID: 16 **Site Name:** Higgan's Point (site 2)
USGSQuad: Fernan Lake **County:** Kootenai **T:** 49N **R:** 03W **S:** 02
Shoreline Jurisdiction State of Idaho, Lands Department **Other Jurisdiction(s):** State of Idaho, Parks and Recreation Department

COMMENT: On list; not visited during field recon. Similar to Sanders Beach, so assumed same sampling requirements.

SHORELINE USES AND FEATURES

Beach play; dry	☑	Shoreline Type Sand	
Beach play; wet	☑	Shore Line Pitch	
Swimming	☐	AboveWaterLine: Moderate	
Fishing ponds/piers	☐	BelowWaterLine: Moderate	
Boat docks/ramps	☐		

UPLAND USES AND FEATURES

Park	☐	General gathering place	☐
School	☐	Campground	☐
Playfield	☐	Picnic areas	☐
Playground; digging	☐	Recreational trails	☐
Playground; non-digging	☐	Elevation Not applicable	
Drinking Water		Comment re: elevation	
None		Assumed all sampling areas within flood plain	

SAMPLES

Dry Beach	Wet Beach	Turbid SW	Uplnd (0-1")	Uplnd (1-6")	Upland (6-12")	Upland (12-18")	Upland (18-24")	DW Sample
7	7	7						

PHOTOS

SiteID: 16 **PhotoID:** **PhotoDate:**
PhotoCmt:

Bunker Hill Basin-Wide RI/FS FSP and QAPP Addenda
Common Use Area Site Summary

General Area of Site Lake Coeur d'Alene

SiteID: 26 **Site Name:** Loffs Bay
USGSQuad: Mica Bay **County:** Kootenai **T:** **R:** **S:**
Shoreline Jurisdiction State of Idaho, Lands Department **Other Jurisdiction(s):** Unknown

COMMENT: Substrate below water line is cobbles; may be difficult to sample.

SHORELINE USES AND FEATURES

Beach play; dry	☐	Shoreline Type Cobbles	
Beach play; wet	☑	Shore Line Pitch	
Swimming	☐	AboveWaterLine: Gentle	
Fishing ponds/piers	☑	BelowWaterLine: Moderate	
Boat docks/ramps	☑		

UPLAND USES AND FEATURES

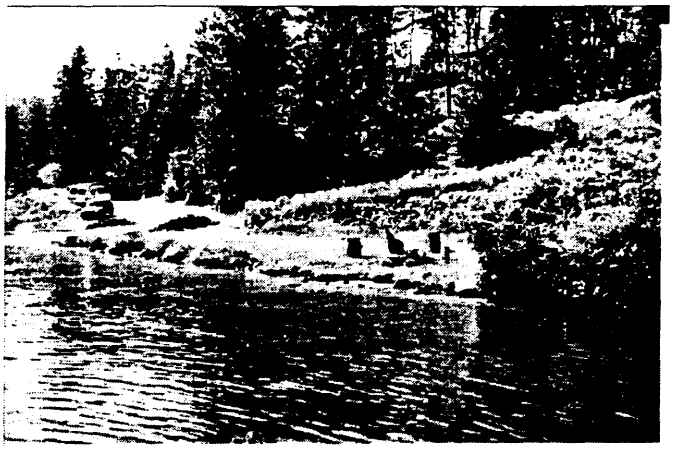
Park	☐	General gathering place	☑
School	☐	Campground	☐
Playfield	☐	Picnic areas	☐
Playground; digging	☐	Recreational trails	☐
Playground; non-digging	☐	Elevation Within flood plain	
Drinking Water None		Comment re: elevation Grassy area next to Lake within flood plain.	

SAMPLES

Dry Beach	Wet Beach	Turbid SW	UpInd (0-1")	UpInd (1-6")	Upland (6-12")	Upland (12-18")	Upland (18-24")	DW Sample
	7	7	7					

PHOTOS

SiteID: 26 **PhotoID:** PHO0010 **PhotoDate:** 6/9/98
PhotoCmt: Common use area.



PHO0010.jpg

Bunker Hill Basin-Wide RI/FS FSP and QAPP Addenda
Common Use Area Site Summary

General Area of Site Lake Coeur d'Alene

SiteID: 32 **Site Name:** Anderson Lake
USGSQuad: Harrison **County:** Kootenai **T:** 48N **R:** 03W **S:** 31
Shoreline Jurisdiction State of Idaho, Lands Department **Other Jurisdiction(s):** Private

COMMENT: Area not accessible during field reconnaissance. Uses according to E. Liverman: grass on-shore where beach play; dry takes place. People fish from shore. Update records during FSPA implementation.

SHORELINE USES AND FEATURES

Beach play; dry	☑	Shoreline Type Sand	
Beach play; wet	☐	Shore Line Pitch	
Swimming	☐	AboveWaterLine: Gentle	
Fishing ponds/piers	☐	BelowWaterLine: Steep	
Boat docks/ramps	☐		

UPLAND USES AND FEATURES

Park	☐	General gathering place	☑
School	☐	Campground	☐
Playfield	☐	Picnic areas	☐
Playground; digging	☐	Recreational trails	☐
Playground; non-digging	☐	Elevation Not applicable	
Drinking Water None		Comment re: elevation	

SAMPLES

Dry Beach	Wet Beach	Turbid SW	Uplnd (0-1")	Uplnd (1-6")	Upland (6-12")	Upland (12-18")	Upland (18-24")	DW Sample
5			5					

PHOTOS

SiteID: 32 **PhotoID:** **PhotoDate:**
PhotoCmt:

Bunker Hill Basin-Wide RI/FS FSP and QAPP Addenda
Common Use Area Site Summary

General Area of Site Coeur d'Alene River

SiteID: 68 **Site Name:** south of Old Mission State Park
USGSQuad: Cataldo **County:** Shoshone **T:** 48N **R:** 01E **S:** 04
Shoreline Jurisdiction State of Idaho, Water Resources Department **Other Jurisdiction(s):** Shoshone County

COMMENT: Not visited; update records during FSPA implementation; site included per EPA OSC Earl Liverman.

SHORELINE USES AND FEATURES

Beach play; dry	☑	Shoreline Type Sand	
Beach play; wet	☑	Shore Line Pitch	
Swimming	☑	AboveWaterLine: Moderate	
Fishing ponds/piers	☐	BelowWaterLine: Moderate	
Boat docks/ramps	☐		

UPLAND USES AND FEATURES

Park	☐	General gathering place	☑
School	☐	Campground	☐
Playfield	☐	Picnic areas	☐
Playground; digging	☐	Recreational trails	☐
Playground; non-digging	☐	Elevation	
Drinking Water		Comment re: elevation	
None			

SAMPLES

Dry Beach	Wet Beach	Turbid SW	Uplnd (0-1")	Uplnd (1-6")	Upland (6-12")	Upland (12-18")	Upland (18-24")	DW Sample
5	5	5	5					

PHOTOS

SiteID: 68 **PhotoID:** **PhotoDate:**
PhotoCmt:

Bunker Hill Basin-Wide RI/FS FSP and QAPP Addenda
Common Use Area Site Summary

General Area of Site Coeur d'Alene River

SiteID: 69 **Site Name:** Skeel Gulch Beach
USGSQuad: Cataldo **County:** Shoshone **T:** 48N **R:** 01E **S:** 04
Shoreline Jurisdiction State of Idaho, Water Resources Department **Other Jurisdiction(s):** Shoshone County

COMMENT: Not visited; update records during FSPA implementation; site included per EPA OSC Earl Liverman.

SHORELINE USES AND FEATURES

Beach play; dry	☑	Shoreline Type Sand	
Beach play; wet	☑	Shore Line Pitch	
Swimming	☑	AboveWaterLine: Moderate	
Fishing ponds/piers	☐	BelowWaterLine: Moderate	
Boat docks/ramps	☐		

UPLAND USES AND FEATURES

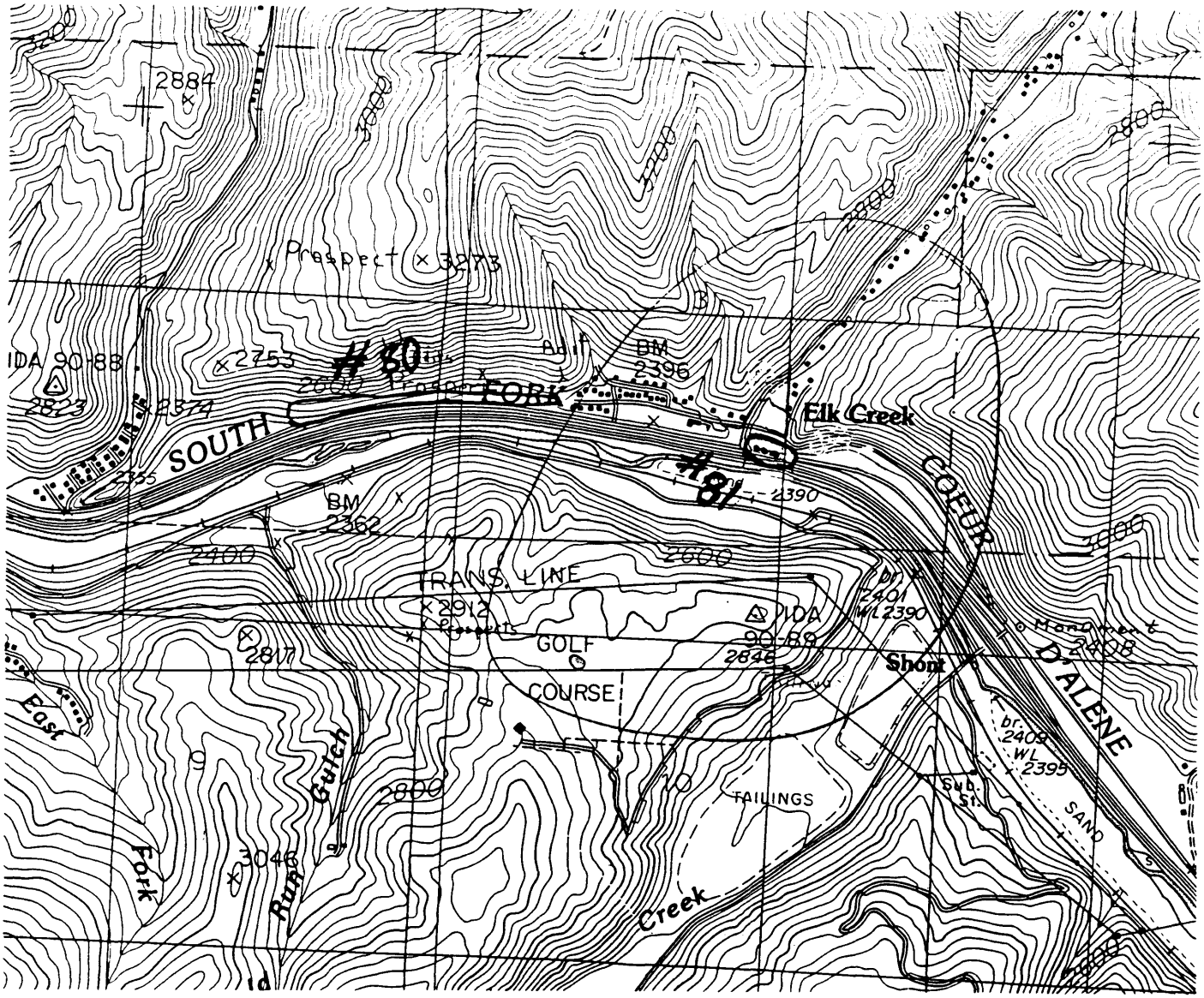
Park	☐	General gathering place	☑
School	☐	Campground	☐
Playfield	☐	Picnic areas	☐
Playground; digging	☐	Recreational trails	☐
Playground; non-digging	☐	Elevation	
Drinking Water		Comment re: elevation	
None			

SAMPLES

Dry Beach	Wet Beach	Turbid SW	Uplnd (0-1")	Uplnd (1-6")	Upland (6-12")	Upland (12-18")	Upland (18-24")	DW Sample
5	5	5	5					

PHOTOS

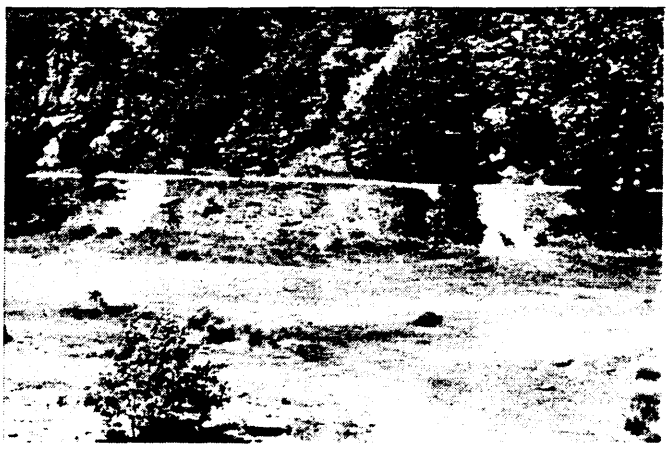
SiteID: 69 **PhotoID:** **PhotoDate:**
PhotoCmt:



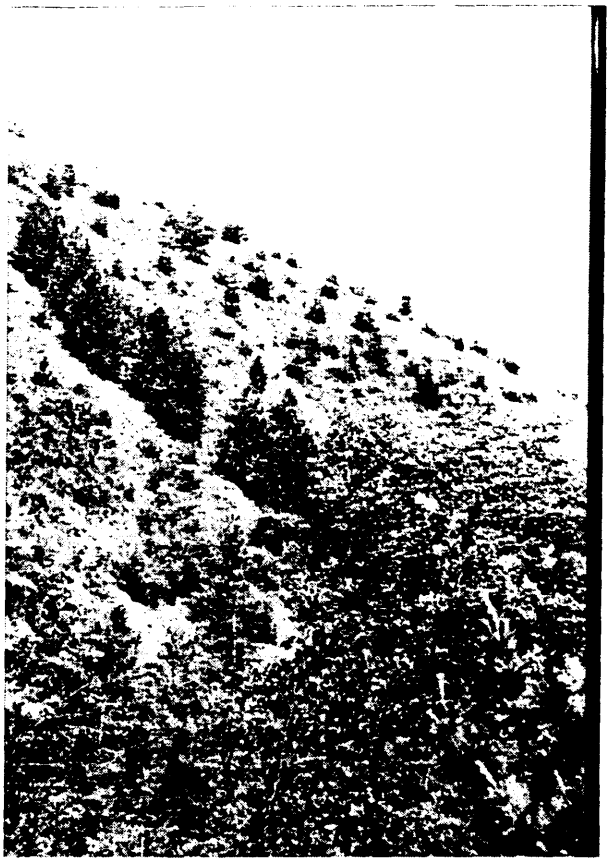
USGSQuad Kellogg East

County **Shoshone**

SiteID	General Area of Site	Site Name	Shoreline Jurisdiction	Other Jurisdiction
80	Coeur d'Alene River S.F.	Elk Creek frontage road/county road	Not Applicable	Private
81	Coeur d'Alene River S.F.	Elk Creek Pond	Not Applicable	Private



PHO0175.jpg



PHO0176.jpg

PHO0177.jpg

PHO0178.jpg

PHO0180.jpg

Field Sampling Plan Alterations for
FSPA No. 5

DRAFT FIELD SAMPLING PLAN ALTERATIONS
BUNKER HILL BASIN-WIDE RI/FS
SHOSHONE COUNTY, IDAHO

ADDENDUM 05

Common Access Areas: Upland Common Use Areas and Lower Basin Recreational Beaches; Sediment/Soil, Surface Water, and Drinking Water Supply Characterization

Prepared for:

United States Environmental Protection Agency
Work Assignment No. 54-20-02QC
Contract No. 68-W9-0054 / 0031
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Prepared by:

URS Greiner
2401 Fourth Avenue, Suite 808
Seattle, Washington 98121

and

CH2M Hill
777 108th Avenue NE
Bellevue, Washington 98009

August 1999

URSG DCN 4162500.5302.05.b

CONTENTS

TABLES

ABBREVIATIONS AND ACRONYMS

BHF	Bunker Hill Facility
BLM	United States Bureau of Land Management
CDRB	Coeur d=Alene River Basin
CLP	contract laboratory program
CUA	Common Use Area
EPA	United States Environmental Protection Agency
FSP	Field Sampling Plan
ITR	inorganic traffic report
RAP	regional analytical protocol
RSCC	Regional Sample Control Coordinator
RTN	regional tracking number
SFCDR	South Fork Coeur d=Alene River
URSG	URS Greiner, Inc.

FIELD SAMPLING PLAN ALTERATIONS

Field Sampling Plan No. 5
Common Access Areas: Upland Common Use Areas and Lower Basin Recreational Beaches; Sediment/Soil, Surface Water, and Drinking Water Supply Characterization

1.0 INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W9-0054 and Work Assignment No. 54-50-0C2Q, URS Greiner, Inc. (URSG) performed yard and home interior sampling at selected homes within the Bunker Hill Facility/Coeur d=Alene River Basin (BHF/CDRB) in Shoshone County, Idaho. Areas within the BHF/CDRB are impacted as a result of releases of metals from mining activities and operations. This document provides a summary of the modifications implemented for the work performed under Field Sampling Plan (FSP) 5 *Common Access Areas: Upland Common Use Areas and Lower Basin Recreational Beaches; Sediment/Soil, Surface Water, and Drinking Water Supply Characterization* (CH2M HILL 1998).

The field efforts performed under FSP 5 occurred during July, August, and September of 1998. Sediment, soil, surface water, and drinking water was sampled at 71 common use areas (CUAs). The CUAs are listed in Table 1.

2.0 PURPOSE AND SCOPE

The purpose of the FSP 5 sampling effort was to provide data to differentiate areas not impacted by mining activities from areas impacted by mining activities. The data provided will also be used to assess the risks to human health and to identify appropriate remedial measures at those areas found to be impacted.

The scope of this field effort consisted of 4 tasks:

- Task 1 - Sampling location verification, including finalizing the CUA sampling locations, identifying the media to be sampled, preparing a site map, identifying new sites and identifying site ownership and receiving permission from the site owner to conduct the sampling

- Task 2 – Collection of soil samples from upland areas at beach sites, play areas, school yards, and parks; collection of dry and wet sediment samples from the wading portion of a beach.

- Task 3 – Collection of surface water samples from river and lake sites at the same locations as the wet sediment samples.

- Task 4 - When public drinking water supplies were identified, a water sample was collected if the supply source was presumed to be from a local well. No water samples were collected if the water was provided by a local community water district. The sample was collected from the tap without purging the water line.

3.0 ALTERATIONS BY TASK

The following subsections provide a brief summary of the task, deviations to the task (if any) and the impact of the deviations on the study.

3.1 Task 1: Sampling Location Verification

The objective of this task was to finalize the CUA sampling locations. Table 1 lists the sampling locations occupied during the FSP 5 sampling effort.

Deviation:

Two sites not on the original list in FSP 5, sites 101 and 102 were added to the field effort while the field work was underway.

Impact: *None*

Deviation:

Six CUA's identified in FSP 5 were not sampled because site access permission was not received from the site owner(s). These sites are summarized in Table 2.

Impact: None Anticipated

Deviation:

Site 13 was not sampled because access permission only was received from 2 of the 7 property owners.

Impact: None Anticipated

3.2 Task 2: Sediment /Soil Sampling

Soil samples were collected from 59 CUAs. Sediment samples were collected from 47 CUAs. The total number of soil and sediment samples collected on FSP 5 are shown in Table 3. The soil and sediment samples were analyzed using method IN-CLP.

Deviation:

Table 4 lists sites where soil and sediment samples could not be collected.

Impact: None Anticipated

Deviation:

Samples MJY535 and MJY544 were submitted to the laboratory with the EPA sample tags switched. The sample tags were transferred to the correct sample containers (per direction from the RSCC).

Impact: None Anticipated

Deviation:

The analysis requested column on ITR 381657 was not marked (for samples MJY799 through MJY808), the EPA RSCC directed the laboratory to perform total metals analysis.

Impact: None

Deviation:

Four soil samples were received at the CLP laboratory with dissolved metals analysis requested on the ITR (351220). The EPA RSCC directed the laboratory to correct the ITR to indicate total metals analysis.

Impact: None Anticipated

Deviation:

Chemtech returned a cooler to the field crew with a sieved sample (MJT584) in the cooler. This sample was repackaged and returned to the CLP laboratory using another ITR to track the return of the sample. The field crew inadvertently submitted all of the ITR to the laboratory. The EPA RSCC directed the laboratory to return the top two copies of the ITR to EPA.

Impact: None Anticipated

Deviation:

The EPA assigned case number was changed during the field effort from 26356 to 25455. Several ITRs (381619, 381617, 381618, 381613, 381610 and 381611) were received at the CLP laboratory after the case number changed, but the ITRs were completed with the former number. The RSCC directed the laboratory to correct the case number on the ITRs. These samples were submitted to the sieve laboratory while case number 26356 was active, however the sample were submitted to the CLP laboratory after the case number was changed to 26455.

Impact: None Anticipated

Deviation:

On 09/17/98, a cooler of 6 rinsate samples were received at the CLP laboratory. This cooler was not custody sealed, the temperature in the cooler was 13 degrees Celsius, the incorrect case number was listed, the date shipped block was not filled in, and the entire ITR was included. The EPA RSCC directed the laboratory to correct the case number, note the cooler temperature, return the top two copies of the ITR to the EPA. Although the cooler was not received with custody seals, all of the sample containers were custody sealed by the field crew. The field crew relinquished the ITR on (/15/98 and the CLP laboratory received the cooler on 9/17/98.

Impact:

The analytical results may be designated with an estimated value (J) qualifier, or rejected

3.3 Task 3: Surface Water Sampling

Surface Water samples were collected at 48 CUAs. Table 3 shows the number of samples collected at each CUA. The water samples were analyzed using method IN-CLP-Low.

Deviation:

Surface water samples were not collected at Sites 43 and 44 since no wading area was present along the shoreline (Table 4).

Impact: None Anticipated

3.4 Task 4: Sampling Drinking Water from Local Wells

Drinking water samples were collected from 4 CUAs (17, 27, 50 and 67). The water samples were analyzed using method IN-CLP-Low.

Deviation:

FSP 5 identified 5 sites where drinking water samples were scheduled to be collected (17, 18, 38, 56, 67). The changes to the drinking water sampling sites is based on information collected by the field crew during the site sampling event.

Impact: None

4.0 REFERENCES

CH2M HILL. 1998a. *Field Sampling Plan and Quality Assurance Project Plan Addenda for the Bunker Hill Basin-Wide RI/FS. Addendum 5 - Common Access Areas: Upland Common Use Areas and Lower Basin Recreational Beaches; Sediment/Soil, Surface Water, and Drinking Water Supply Characterization*. Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0031. July 24, 1998.

CCC. 1998b. *FSPA 05 - Amended Site Specific Sample Plans, sites 80, 95, and 100.* August 20, 1998.

Table 1
Summary of CUAs

Site	Site Area	Site Name	Date Sampled
1	Spokane River	N. Idaho College Beach along Spokane River	8/6/98
2	Lake Coeur d'Alene	N. Idaho College Beach along Lake Coeur d'Alene	8/7/98
3	Spokane River	Post Falls City Beach/River Park	8/4/98
5	Spokane River	Green Ferry Bay County Park	8/5/98
6	Spokane River	Black Bay	8/3/98
7	Spokane River	BLM Pump Station	8/2/98
8	Spokane River	Corbin Park	7/30/98
9	Lake Coeur d'Alene	Coeur d'Alene Beach at City Park	8/10/98
10	Lake Coeur d'Alene	Tubbs Hill (site 1)	8/11/98
11	Lake Coeur d'Alene	Tubbs Hill (site 2)	8/11/98
12	Lake Coeur d'Alene	Tubbs Hill (site 3)	8/12/98
15	Lake Coeur d'Alene	Higgan's Point (site 1)	8/5/98
16	Lake Coeur d'Alene	Higgan's Point (site 2)	8/5/98
17	Lake Coeur d'Alene	Harrison Beach (site 1 - West)	8/6/98
18	Lake Coeur d'Alene	Harrison Beach (site 2 - North)	8/6/98
19	Lake Coeur d'Alene	Cougar Bay	8/11/98
21	Lake Coeur d'Alene	Blackwell Island	8/3/98
23	Lake Coeur d'Alene	Bell Bay	7/31/98
24	Lake Coeur d'Alene	Mica Bay	8/12/98
25	Lake Coeur d'Alene	Rockford Bay	8/7/98
26	Lake Coeur d'Alene	Loffs Bay	8/9/98
27	Lake Coeur d'Alene	Windy Bay	7/31/98
29	Lake Coeur d'Alene	Spokane Point (on reservation)	8/31/98
30	Lake Coeur d'Alene	Fuller Landing	8/7/98
33	Coeur d'Alene River	Trestle area next to Route 97	8/7/98
35	Coeur d'Alene River	Springston Beach Site	8/13/98
36	Coeur d'Alene River	Across river from Springston	8/14/98
38	Coeur d'Alene River	Thompson Lake	9/2/98
39	Coeur d'Alene River	RM135 long beach /Springston	8/14/98
41	Coeur d'Alene River	West of Blue Lake	9/2/98
43	Coeur d'Alene River	West beach near Medimont	9/10/98

Site	Site Area	Site Name	Date Sampled
44	Coeur d'Alene River	Medimont Hill camping area	9/9/98
45	Coeur d'Alene River	Medimont Boat Ramp	9/9/98
46	Coeur d'Alene River	Rainy Hill fishing area	8/10/98
47	Coeur d'Alene River	Rainy Hill picnic area	8/9/98
48	Coeur d'Alene River	RM 145	8/15/98
49	Coeur d'Alene River	Beach near canal to Killarney Lake	8/31/98
50	Coeur d'Alene River	Killarney Lake boat launch	8/13/98
51	Coeur d'Alene River	Lane Beach	8/31/98
52	Coeur d'Alene River	Near east end of Killarney Lake	8/30/98
53	Coeur d'Alene River	Beach below Ward Ridge	8/30/98
54	Coeur d'Alene River	Blackrock Gulch Beach	8/29/98
55	Coeur d'Alene River	Quarry Beach	8/29/98
56	Coeur d'Alene River	RV park across from Blackrock Gulch	9/1/98
57	Coeur d'Alene River	Beach upstream from Quarry	9/1/98
58	Coeur d'Alene River	East end of Blackrock Gulch Marsh	8/27/98
59	Coeur d'Alene River	East of Rose Creek	8/15/98
60	Coeur d'Alene River	West of Rose Lake	8/15/98
63	Coeur d'Alene River	Bull Run Peak Beach	8/27/98
64	Coeur d'Alene River	Mouth of 4th July marsh	9/1/98
65	Coeur d'Alene River	South of Mission Flats	9/10/98
66	Coeur d'Alene River	Beach in Mission Flats	8/2/98
67	Coeur d'Alene River	Old Mission State Park boat launch	7/29/98
68	Coeur d'Alene River	South of Old Mission State Park	8/26/98
69	Coeur d'Alene River	Skeel Gulch Beach	8/26/98
77	SFCDR	Confluence with Coeur d'Alene River (beach areas & RR ROW)	8/13/98
80	SFCDR	Elk Creek frontage road/county road	8/24/98
81	SFCDR	Elk Creek Pond	8/24/98
89	SFCDR	Silverton T-ball/Wellman Field	8/22/98
90	SFCDR	Silverton T-ball/Wellman Field Park	8/23/98
91	SFCDR	Silverton T-ball/Wellman & Sather fields parking lot	8/28/98
92	SFCDR	Silverton Elementary School/Huggy Bear Day Care	8/18/98
94	SFCDR	Silverton ballfield next to Huggy Bear Day Care	8/21/98
95	SFCDR	Silverton School District Sather Field	8/20/98
96	SFCDR	Wallace City Park (monument)	8/27/98
97	SFCDR	Wallace Library	8/27/98

Site	Site Area	Site Name	Date Sampled
98	SFCDR	Wallace Depot	8/29/98
99	SFCDR	Small Wallace City Park near schools	8/29/98
100	SFCDR	Wallace High School	8/26/98
101	SFCDR	Wallace Canyon Creek Park	9/2/98
102	SFCDR	Wallace Visitor-s Center and parking lot	9/12/98

Notes:
BLM - Bureau of Land Management
RM - river mile
ROW - right of way
RR - railroad
RV - recreational vehicle
SFCDR - South Fork Coeur d-Alene River

Table 2
CUAs Not Sampled, Access Permission Not Received

Site	Site Area	Site Name
13	Lake Coeur d'Alene	Sanders Beach (site 1)
32	Coeur d'Alene River	Anderson Lake
34	Coeur d'Alene River	East end of Anderson Lake
40	Coeur d'Alene River	River near east end of Thompson Lake
42	Coeur d'Alene River	East end of Blue Lake
61	Coeur d'Alene River	South side of river across from Rose Lake

Table 3
Number of Samples Collected

Site	Site Name	Soil	Sediment	Surface Water	Drinking Water
1	N. Idaho College BeachBalong Spokane River	9	14	8	
2	N. Idaho College BeachBalong Lake		17	7	
3	Post Falls City Beach/River Park	10	16	8	
5	Green Ferry Bay County Park	7	16	7	
6	Black Bay		14	7	
7	BLM Pump Station	8	15	8	
8	Corbin Park		15	8	
9	Coeur d'Alene Beach at City Park		29	8	
10	Tubbs Hill (site 1)		15	7	
11	Tubbs Hill (site 2)		26	8	
12	Tubbs Hill (site 3)		15	8	
15	Higgan's Point (site 1)		15	7	
16	Higgan's Point (site 2)		16	8	
17	Harrison Beach (site 1 - West)	7		8	1
18	Harrison Beach (site 2 - North)		31	9	
19	Cougar Bay	8	15	8	
21	Blackwell Island	9	16	8	
23	Bell Bay	7	2	8	
24	Mica Bay	10	15	7	
25	Rockford Bay	8			
26	Loffs Bay	10	10	10	
27	Windy Bay	8	2	7	1
29	Spokane Point (on reservation)		7	8	
30	Fuller Landing	1		7	
33	Trestle area next to Route 97	5	6		
35	Springston Beach Site	6	11	6	
36	Across river from Springston	6	11	5	
38	Thompson Lake	6	5	5	
39	RM135 long beach /Springston	6	11	6	
41	West of Blue Lake	6	5	6	
43	West beach near Medimont	5			

Site	Site Name	Soil	Sediment	Surface Water	Drinking Water
44	Medimont Hill camping area	6			
45	Medimont Boat Ramp	6	5	6	
46	Rainy Hill fishing area	6			
47	Rainy Hill picnic area	6	2	5	
48	RM 145	6	11	6	
49	Beach near canal to Killarney Lake	6	11	6	
50	Killarney Lake boat launch	6			1
51	Lane Beach	5	11	5	
52	Near east end of Killarney Lake	5	11	5	
53	Beach below Ward Ridge	5	12	6	
54	Blackrock Gulch Beach	6	10	5	
55	Quarry Beach	6	12	6	
56	RV park across from Blackrock Gulch	5	6	5	
57	Beach upstream from Quarry	6	11	6	
58	East end of Blackrock Gulch Marsh	6	12	6	
59	East of Rose Creek	6	11	6	
60	West of Rose Lake	5	11	5	
63	Bull Run Peak Beach	6	12	6	
64	Mouth of 4th July marsh	5			
65	South of Mission Flats	6	11	6	
66	Beach in Mission Flats	5			
67	Old Mission State Park boat launch	5			1
68	South of Old Mission State Park	6	12	6	
69	Skeel Gulch Beach	6	12	6	
77	Confluence with Coeur d'Alene River (beach areas & RR ROW)	6	15	6	
80	Elk Creek frontage road/county road	6			
81	Elk Creek Pond		12	6	
89	Silverton T-ball/Wellman Field	84			
90	Silverton T-ball/Wellman Field Park	85			
91	Silverton T-ball/Wellman & Sather fields parking lot	85			
92	Silverton Elementary School/Huggy Bear Day Care	171			
94	Silverton ballfield next to Huggy Bear Day Care	87			

Site	Site Name	Soil	Sediment	Surface Water	Drinking Water
95	Silverton School District Sather Field	172			
96	Wallace City Park (monument)	33			
97	Wallace Library	31			
98	Wallace Depot	30			
99	Small Wallace City Park near schools	32			
100	Wallace High School	86			
101	Wallace Canyon Creek Park	32			
102	Wallace Visitor=s Center and parking lot	58			

Notes:
Number of samples includes field duplicates
BLM - Bureau of Land Management
RM - river mile
ROW - right of way
RR - railroad
RV - recreational vehicle
SFCDR - South Fork Coeur d=Alene River

Table 4
Summary of Field Changes to Sample Collection

Site	Site Name	Field Changes
10	Tubbs Hill (site 1)	Upland soil samples were not collected, no upland area is present
11	Tubbs Hill (site 2)	Upland soil samples were not collected, no upland area is present
12	Tubbs Hill (site 3)	Upland soil samples were not collected, no upland area is present
17	Harrison Beach (site 1 - West)	Wet sediments in the 80 mesh range were not present at the site, wet sediments consisted of large gravel to large cobble
23	Bell Bay	Wet sediments in the 80 mesh range were not present at the site, wet sediments consisted of very coarse sand to large cobble, wave action moved fine sediments to deeper depths
27	Windy Bay	Wet sediments in the 80 mesh range were not present at the site, wet sediments consisted of very coarse sand to large cobble, wave action moved fine sediments to deeper depths
30	Fuller Landing	All wet sediment sample locations were either under the boat dock or on concrete ramps
38	Thompson Lake	Dry beach samples were not collected, no dry beach present
41	West of Blue Lake	Dry beach samples were not collected, no dry beach present
43	West beach near Medimont	Wet beach and surface water samples not collected because no wading area is present along shoreline
44	Medimont Hill camping area	Wet beach and surface water samples not collected because no wading area is present along shoreline
47	Rainy Hill Picnic Area	Four wet sediment sample locations met refusal at 0-1 inch depth or less
56	RV park across from Blackrock Gulch	Dry beach samples were not collected, no dry beach present
80	Elk Creek frontage road/county road	Upland soil sample collection reduced from 19 locations to 5 locations (surface soil only) due to nondeveloped site use and potential for continual flooding (CH2M HILL 1998b)
100	Wallace High School	Upland soil sample collection reduced from 57 locations to 19 locations by combining the three play areas into one site which will provide adequate coverage (CH2M HILL 1998b)
101	Wallace Canyon Creek Park	New site added to list, 7 upland soil sample locations
102	Wallace Visitor-s Center and parking lot	New site added to list, 14 upland soil sample locations

Notes:
RV - recreational vehicle

Erratum for
Field Sampling Plan Alterations for
FSPA No. 5

ERRATUM FOR FSPA NO. 5 ALTERATION REPORT

Several deviations were identified to the *Draft Field Sampling Plan Alterations Bunker Hill Basin-Wide RI/FS, Shoshone County, Idaho, Addendum 5* dated August 1999. The following is a list of the deviations found:

- Section 3.2 - Soil samples were collected from a total of 58 CUAs not 59 and sediment samples were collected from a total of 48 CUAs not 47.

- Section 3.2 - Two general deviations were not included in this section. These deviations do not impact the project. These are described below:

    1. The randomized grid was not used at the upland sites. The following methodology was used instead. The length and width of the area to be sampled was measured, and one corner of the site was selected as the starting point. A randomized length and width was then calculated by multiplying the total length of the site by a random percent and the total width of the site by a different random percent. The calculated length and width was measured from the starting point to establish the sampling location.

    2. At some of the remote beaches, the transects were measured using a wheel instead of paced lines.

- Table 1 - Site 102 was sampled on both 09/11/98 and 09/12/98. Only 09/12/98 is included on the table.

- Table 3 - The sample distribution for site 30 is incorrect. This table should show no soil samples collected and 1 sediment sample collected.

- Table 3 - The number of samples collected is incorrect on this table for 3 sites. The corrections are summarized below:

    1. Site 96 - 31 soil samples, of which 28 were environmental samples and 3 were field duplicates, were collected, not 33.

2. Site 97 - 30 soil samples, of which 27 were environmental samples and 3 were field duplicates, were collected, not 31.

3. Site 98 - 31 samples, of which 28 were environmental samples and 3 were field duplicates, were collected, not 30.

- Table 4 - Summary of Field Changes to Sample Collection is incomplete and several deviations have been identified. These are summarized below:

1. No entry was included on Table 4 for Site 2 even though two locations (16 and 17) were resampled a month after the initial sampling event. The sample collected during August from location 16 was not analyzed. The sample collected during September from this location was analyzed. The sample collected in August and the sample collected in September from location 17 were both analyzed.

2. No entry was included on Table 4 for Site 3 even though 3 additional upland soil locations were sampled in areas of possible high exposure. Therefore, 10 upland soil samples were collected instead of the 7 planned samples.

3. The entry on Table 4 for Site 11 is incomplete. Site 11 was chosen as one of the randomly selected lake beach recreation areas which was to undergo additional dry beach sampling for quality assurance purposes (19 locations instead of 7 locations). Sampling was attempted at 19 locations. However, samples could not be collected at 3 locations, because of rocks present at the sampling location. In addition, samples from locations 4, 5, 6, 7, and 9 were not collected from the full depth range (0-1ft) due to refusal.

4. No entry was included on Table 4 for Site 15 even though samples from locations 3, 4, 5, 6, and 7 were not collected from the full depth range (0-0.5 ft) due to refusal.

5. Table 4 incorrectly implies that no wet sediment samples were obtained at Site 23. Wet sediment samples were obtained at 2 locations. Seven sampling locations were planned for this site.

6. No entry was included on Table 4 for Site 24 even though 2 additional upland soil locations were sampled. Therefore, 9 upland soil samples were collected instead of the 7 planned samples. The two additional upland soil samples consisted of sand from two separate play areas.

7. No entry was included on Table 4 for Site 25 even though the sample collected at location 2 was not analyzed because not enough sample was collected.

8. No entry was included in Table 4 for Site 26 even though 2 additional upland soil, 2 additional wet sediment, and 2 additional surface water samples were collected. Therefore, a total of 9 upland soil samples, 9 wet sediment samples, and 9 surface water samples were obtained instead of the 7 planned samples per media.

9. Table 4 incorrectly implies that no wet sediment samples were obtained at Site 27. Wet sediment samples were obtained at 2 locations. Seven sampling locations were planned for this site.

10. Table 4 incorrectly states that no wet sediment samples were obtained at Site 30. A wet sediment sample was obtained at 1 location. Seven sampling locations were planned for this site.

11. No entry was included on Table 4 for surface water sampling at Site 30. Only 6 surface water samples were obtained instead of the 7 planned samples because one location was under a dock and inaccessible.

12. Table 4 incorrectly states that 4 wet sediment sample locations met refusal at Site 47. Actually, only 3 wet sediment sample locations met refusal, however a field duplicate was planned at one of these locations. Therefore, only 2 wet sediment samples were obtained from Site 47, because five wet sediment sampling locations were planned for this site.

13. No entry was included on Table 4 for Site 77. Only 4 wet beach sediment samples were collected. Sampling refusal occurred at one of the planned locations.

14. Table 4 includes a deviation for Site 80. However, this deviation was previously noted in the *FSPA 05—Amended Site Specific Sample Plans, Sites, 80, 95, and 100*. Therefore, the sampling at Site 80 was consistent with the planned activities for the site.

15. No entry was included on Table 4 for Site 91. A soil sample was not obtained from the 12-18 inch depth interval at location 19 due to hand auger refusal.

16. No entry was included on Table 4 for Site 92. Soil samples were not obtained from the 0-1 inch depth interval at locations 17 and 20 because no fine material was present at these locations. In addition, three locations (21, 26, and 35) were resampled at one depth interval 1 month after the initial sampling event. The samples collected during August from the 0 to 0.08-foot depth interval from locations 21, 26, and 35 were not analyzed. The samples collected during September from the 0 to 0.08-foot depth interval from these locations were analyzed.

17. No entry was included on Table 4 for Site 94. Two samples from the 18-24 inch depth interval were accidentally obtained from this site even though the field sampling plans call for only a single sample. These samples were obtained from locations 2 and 6.

18. No entry was included on Table 4 for Site 95 even though one location (11) was resampled a month after the initial sampling event. The samples collected during August and September from the 0 – 0.08-foot depth interval from location 11 were both analyzed.

19. No entry was included on Table 4 for Site 96. A soil sample was not obtained from the 12-18 inch depth interval at location 5 due to hand auger refusal.

20. No entry was included on Table 4 for Site 97. Soil samples were not obtained from the 6-12 inch and the 12-18 inch depth intervals at location 2 due to hand auger refusal.

21. No entry was included on Table 4 for Site 98. A soil sample was not obtained from the 18-24 inch depth interval due to hand auger refusal caused by compacted backfill and general debris.

22. Table 4 includes a deviation for Site 100. However, this deviation was previously noted in the *FSPA 05—Amended Site Specific Sample Plans, Sites, 80, 95, and 100.* Therefore, the sampling at Site 100 was consistent with the planned activities for the site.

23. Table 4 does not include the following deviation for Site 102. A soil sample was not obtained from the 6-12 inch and the 12-18 inch depth interval at location 9, the 12-18 inch depth interval from location 10, and the 6-12 inch and the 12-18 inch depth interval at location 13 due to refusal.

Field Sampling Plan Alterations for
FSPA No. 6

FIELD SAMPLING PLAN ALTERATIONS
BUNKER HILL BASIN-WIDE RI/FS
SHOSHONE COUNTY, IDAHO

ADDENDUM 06

Residential Sampling to Support the Human Health Risk Assessment

Prepared for:

United States Environmental Protection Agency
Work Assignment No. 54-20-02QC
Contract No. 68-W9-0054 / 0031
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Prepared by:

URS Greiner Woodward Clyde
2401 Fourth Avenue, Suite 808
Seattle, Washington 98121

and

CH2M Hill
777 108th Avenue NE
Bellevue, Washington 98009

July 6, 1999

URSG DCN 4162500.5303.05.b

CONTENTS

ABBREVIATIONS AND ACRONYMS

BHF	Bunker Hill Facility
CDRB	Coeur d'Alene River Basin
CLP	contract laboratory program
Corps	United States Army Corps of Engineers
EPA	United States Environmental Protection Agency
FSP	field sampling plan
ITR	inorganic traffic report
RAP	regional analytical protocol
RSCC	Regional Sample Control Coordinator
RTN	regional tracking number
URSGWC	URS Greiner Woodward Clyde, Inc.

FIELD SAMPLING PLAN ALTERATIONS

Field Sampling Plan No. 6
Residential Sampling to Support the Human Health Risk Assessment

1.0 INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W9-0054 and Work Assignment No. 54-50-0C2Q, URS Greiner Woodward Clyde, Inc. (URSGWC) performed yard and home interior sampling at selected homes within the Bunker Hill Facility/Coeur d'Alene River Basin (BHF/CDRB) in Shoshone County, Idaho. Areas within the BHF/CDRB are impacted as a result of releases of metals from mining activities and operations. This document provides a summary of the modifications implemented for the work performed under Field Sampling Plan (FSP) 6 *Residential Sampling to Support the Human Health Risk Assessment* (URSG 1998b).

The field efforts performed under FSP 6 occurred during September and October of 1998 and included yard soil sampling and home interior sampling at 90 residences within the basin.

2.0 PURPOSE AND SCOPE

The purpose of the FSP 6 sampling effort was to provide data from yard and home interior samples collected at residences within the basin to evaluate human health risks.

The scope of this field effort consisted of 4 tasks:

- Task 1 – Collection of outdoor soils at locations distributed throughout the front and back yards of each residence.
- Task 2 – Collection of garden produce at residences with gardens. Samples were collected of leafy (e.g., lettuce, cabbage) and root (e.g., radishes, beets, carrots) vegetables.
- Task 3 – Collection of drinking water from each residence: a first run sample collected immediately after turning on the tap before water had been flushed through the pipes and a flushed sample collected after water had been allowed to run through the pipes for approximately 10 minutes.
- Task 4 – Collection of indoor dust from vacuum cleaner bags used in the residence, floor mats left at the residence for at least 3 weeks, and peeling exterior/interior paint.

3.0 ALTERATIONS BY TASK

The following subsections provide a brief summary of the task, deviations to the task (if any) and the impact of the deviations on the study.

3.1 Task 1: Outdoor Soil

Eighty residential yards were sampled during this field effort. A total of 2,045 samples were collected for analysis. The soil samples were analyzed using method IN-CLP.

Deviation:

Inorganic traffic report (ITR) number 379959 incorrectly requested dissolved metals analysis for the soil samples. The laboratory was directed by the Regional Sample Control Coordinator (RSCC) to note the error and proceed with a total metals analysis of the soil samples.

Impact: None

Deviation :

A discrepancy was noted between the sample number listed on ITR number 379782 and the corresponding number on the sample container. Sample number MJW014 was entered on the ITR, however the number MJZ014 was listed on the sample container label and tag. The field crew was contacted for clarification and RSCC was informed that the sample container label and tag were correct. The RSCC directed the laboratory to make the correction to the ITR.

Impact : None

3.2 Task 2: Garden Produce

Garden Produce samples were collected from 27 residences. A total of 47 samples were submitted for analysis. Samples were analyzed using methods 160.3 and 6010.

Deviations: None

3.3 Task 3: Drinking Water

Drinking water samples were collected from 89 residences. A total of 194 samples were submitted for analysis. Samples were analyzed using methods IN-CLP and IN-CLP-Low.

Deviations: None

3.4 Task 4: Indoor Dust

Vacuum dust samples were collected from 76 residences and submitted for analysis. Door mats were placed at 84 residences and retrieved 3 weeks later for analysis. A total of 180 dust samples were analyzed using method 6010. Paint chip samples were collected at 38 residences and 56 samples were submitted for analysis using method 6010.

Deviations: None

6.0 ADMINISTRATIVE ALTERATIONS

Changes to the contacts listed in FSP 6 included the addition of the URSG Task Lead (Steven Hughes) and change in URSG RAP Project Manager (David Mohr was replaced by Todd Goins). The Field Contact Number for the URSG Kellogg office was changed to 208-786-1401 (a direct line to URSG/CH2M HILL). An alternative fax number for the URSG field office is 208-783-4561 (IDEQ fax number).

7.0 REFERENCES

URS Greiner, Inc. (URSG). 1998. *Field Sampling Plan for the Bunker Hill Basin-Wide RI/FS Addendum No. 6 - Residential Sampling to Support the Human Health Risk Assessment.* Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0054. September 18, 1998.

Erratum for
Field Sampling Plan Alterations for
FSPA No. 6

ERRATUM FOR FSPA NO. 6 ALTERATION REPORT

Several deviations were identified to the *Draft Field Sampling Plan Alterations for Bunker Hill Basin-Wide RI/FS Shoshone County, Idaho, Addendum 06, Residential Sampling to Support the Human Health Risk Assessment* dated August 1999. The following is a list of the deviations found:

- In Section 3.1, the alteration report incorrectly identified the quantity of outdoor soil samples as 2,045. The quantity of outdoor soil samples is 2,041.
- The following deviations were not included in Section 3.1 of the alteration report:
    1. Samples were not collected at all 4 depths as planned at 4 residences due to hand auger refusal.
    2. Less than the minimum 5 play area, garden plot, lawn/open area soil samples were obtained at 8 residences.
    3. At one residence, the samples were not composited from 4 subsample locations because the yard was too small. Grab samples were obtained instead.
    4. A sample was not collected from the 18 to 24 inch depth at 4 residences.
    5. If a downspout was not present, a sample was obtained at the roof dripline.
- The following deviations were not included in Section 3.2 of the alteration report:
    1. Samples were collected and placed in plastic ziplock bags or whirl pak bags.
    2. Leafy produce was resampled at 3 residences.
    3. Leafy vegetable samples from nine residences were not analyzed because an insufficient quantity of sample was collected.

4. Below ground vegetable samples from one residence was not analyzed because an insufficient quantity of sample was collected.

- Section 3.4 incorrectly identified both the number of residences sampled and the number of samples. Indoor dust samples were collected from 87 residences. Floor mat samples were obtained at 84 residences, vacuum cleaner bag samples were collected from 77 residences, and paint chip samples were collected at 41 residences. A total of 235 indoor dust samples were collected. Ninety-six floor mat samples were collected, 84 vacuum cleaner bag samples were collected, and 55 paint chip samples were collected.

- The alteration report indicated that there were no deviations for the indoor dust samples. However, there were several deviations. These are listed below:

  1. At two residences, a floor mat was not placed because the houses were not occupied.

  2. At two residences, the floor mat was placed but it was not collected because residents were not home at all or were home for a limited period of time.

  3. When the floor mat from one residence was being vacuumed by Terragraphics personnel as part of the sample collection procedure, the vacuum bag broke and the sample was lost.

  4. At four residences, the residents were home for a limited period of time during the 3-week period. These mats were collected and analyzed.

  5. At five residences, the resident picked up and held the mat vertical or picked up and stored in a shed. These mats were collected and analyzed.

  6. At five residences, the mat was rolled up or rolled up and bagged. These mats were collected and analyzed.

  7. At three residences, the mats were cleaned or shook out. These mats were collected and analyzed.

8. The method used to collect dust samples from vacuum cleaner bags was modified. A sufficient volume of dust could not be collected by tapping the vacuum cleaner bag and collecting the settled dust from the bottom of the bag. Therefore, the contents of the vacuum cleaner bag were screened using a 0.25-inch screen. The fines that passed through the screen were collected and analyzed.

9. The method used to collect paint chip samples was modified slightly. Plastic sheeting was rarely used beneath the paint chip sampling locations because the paint chips were large and few in number, placement of plastic sheeting below the sampling locations was awkward, or paint chips were collected at multiple locations making multiple placement of plastic sheeting impractical. Paint chip debris was generally contained by the samplers, and the amount falling to the floor or ground was minimal. Paint chips were placed in plastic whirl pak bags instead of glass jars.

Field Sampling Plan Alterations for
FSPA No. 7

DRAFT FIELD SAMPLING PLAN ALTERATIONS
BUNKER HILL BASIN-WIDE RI/FS
SHOSHONE COUNTY, IDAHO

ADDENDUM 07

Fast Track Sampling of Residential Yards in the Coeur d=Alene Basin

Prepared for:

United States Environmental Protection Agency
Work Assignment No. 54-20-02QC
Contract No. 68-W9-0054 / 0031
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Prepared by:

URS Greiner
2401 Fourth Avenue, Suite 808
Seattle, Washington 98121

and

CH2M Hill
777 108th Avenue NE
Bellevue, Washington 98009

August 1999

URSG DCN 4162500.5304.05.b

DRAFT

CONTENTS

ABBREVIATIONS AND ACRONYMS

BHF	Bunker Hill Facility
CDRB	Coeur d=Alene River Basin
EPA	United States Environmental Protection Agency
FSP	field sampling plan
URSG	URS Greiner, Inc.

FIELD SAMPLING PLAN ALTERATIONS

Field Sampling Plan No. 7
Fast Track Sampling of Residential Yards in the Coeur d=Alene Basin

1.0 INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W9-0054 and Work Assignment No. 54-50-0C2Q, URS Greiner, Inc. (URSG) performed yard sampling at selected homes within the Bunker Hill Facility/Coeur d=Alene River Basin (BHF/CDRB) in Shoshone County, Idaho. Areas within the BHF/CDRB are impacted as a result of releases of metals from mining activities and operations. This document provides a summary of the modifications implemented for the work performed under Field Sampling Plan (FSP) 7 *Fast Track Sampling of Residential Yards in the Coeur d=Alene Basin* (URSG 1998a).

The field effort for FSP 7 was completed in July of 1998 and included soil sampling at 19 residential yards within the basin.

2.0 PURPOSE AND SCOPE

The purpose of the FSP 7 sampling effort was to provide rapid sampling of residential yards at homes that had not been previously sampled. The analytical results from this sampling effort were provided to the U.S. Army Corps of Engineers for yard remediation during the summer of 1998.

The focus of this field investigation was to provide rapid turnaround site-specific soil data for selected residential yards to allow the possible addition of these homes to the more intensive residential sampling effort under FSP 6 - *Residential Sampling to Support the Human Health Risk Assessment* (URSG 1998b).

3.0 ALTERATIONS BY TASK

The following subsection provides a brief summary of the task and deviations to the task, if any.

3.1 Fast Track Sampling of Residential Yards in the Coeur d'Alene Basin

Soil samples were collected from 19 residential yards during this field effort. A total of 228 samples were collected for analysis. The soil samples were analyzed using method IN-CLP.

Deviations: None

4.0 REFERENCES

URS Greiner, Inc. (URSG). 1998a. *Field Sampling Plan for the Bunker Hill Basin-Wide RI/FS Addendum No. 7 - Fast Track Sampling of Residential Yards in the Coeur d'Alene Basin*. Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0054. July 22, 1998.

———. 1998b. *Field Sampling Plan for the Bunker Hill Basin-Wide RI/FS Addendum No. 6 - Residential Sampling to Support the Human Health Risk Assessment*. Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0054. July 1, 1998.

Erratum for
Field Sampling Plan Alterations for
FSPA No. 7

ERRATUM FOR FSPA NO. 7 ALTERATION REPORT

Several deviations were identified to the *Draft Field Sampling Plan Alterations, Bunker Hill Basin-Wide RI/FS, Shoshone County, Idaho, Addendum 07, Fast Track Sampling of Residential Yards in the Coeur d'Alene Basin* dated August 1999. The following is a list of the deviations found.

The following deviations were not included in the in Section 3.1 of the alteration report:

1. At one residence, a sample was not obtained from the 18-24 inch depth because the field sampling plan was changed after field activities had begun and this residence was sampled prior to the change in the sampling plan. (The sample from this residence was collected on July 20, 1998, and the change to field sampling plan was made on July 22, 1998.)

2. At one residence, a single core was obtained from the driveway because the driveway was very short.

3. At one residence, an additional sample was collected from the 12-18 inch depth interval in the gravel driveway at the request of the EPA On-Scene Coordinator (OSC).

4. At 4 residences, two cores instead of one were collected and composited from the child's play area. This provides better coverage of the play area.

5. At 4 residences, more than one core subsample was collected and composited from the garden area. This provides better coverage of the garden area

6. At one residence in the 6-12 inch depth interval at certain yard locations, a black crystalline material was found. This material was sampled.

Field Sampling Plan Alterations for
FSPA No. 8

DRAFT FIELD SAMPLING PLAN ALTERATIONS
BUNKER HILL BASIN-WIDE RI/FS
SHOSHONE COUNTY, IDAHO

ADDENDUM 08

Tier 2 Source Area Characterization

Prepared by
URS Greiner
2401 Fourth Avenue, Suite 808
Seattle, Washington 98121

and

CH2M Hill
777 108th Avenue NE
Bellevue, Washington 98009

Prepared for
United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101
Work Assignment No. 54-50-0C2Q
Contract No. 68-W9-0054/0031

September 1999

URSG DCN 4162500.5305.05.b

DRAFT

CONTENTS

TABLES

APPENDIXES

ABBREVIATIONS AND ACRONYMS

ARI	Analytical Resources, Inc.
bgs	below ground surface
BHF	Bunker Hill Facility
CC	Canyon Creek
CDRB	Coeur d'Alene River Basin
CLP	contract laboratory program
Corps	United States Army Corps of Engineers
EFNM	East Fork Ninemile Creek
EPA	United States Environmental Protection Agency
FSP	field sampling plan
GS	ground surface
HDPE	high density polyethylene
ITR	inorganic traffic report
MFG	McFarren Gulch
MS	matrix spike
MSD	matrix spike duplicate
NM	Ninemile Creek
RAP	regional analytical protocol
RSCC	Regional Sample Control Coordinator
RTN	regional tracking number
RV	river
SF	South Fork Coeur d'Alene River
SFCDR	South Fork Coeur d'Alene River
URSG	URS Greiner, Inc.
WFMFG	West Fork McFarren Gulch
WFNM	West Fork Ninemile Creek
µm	micrometers

FIELD SAMPLING PLAN ALTERATIONS

Addendum No. 8
Tier 2 Source Area Characterization

1.0 INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W9-0054/003 and Work Assignment No. 54-50-0C2Q, URS Greiner, Inc. (URSG) installed monitoring wells and collected soil, surface water, and groundwater samples as part of the Bunker Hill Basin-wide RI/FS in Shoshone County, Idaho. This document provides a summary of the modifications implemented for the work performed under Field Sampling Plan Addendum 08 – Tier 2 Source Area Characterization (URSG 1998a) (FSP08).

The field efforts performed under FSP08 occurred during October, November, and December of 1998 and included installation of 43 monitoring wells and 7 piezometers, and the collection of 44 surface soil, 77 subsurface soil, 72 surface water, and 84 groundwater samples (not including field duplicates). Monitoring wells and piezometers were installed along Canyon Creek (35), Ninemile Creek (14), and Pine Creek (1). Subsurface soil samples were collected while installing the monitoring wells and piezometers. Groundwater samples were collected from the installed monitoring wells, piezometers, and one domestic well. Surface soil samples were collected at selected mining-impacted sites within Canyon Creek, Ninemile Creek, and at the Old Mullan Dump. Surface water samples were collected from Canyon Creek, Ninemile Creek, McFarren Gulch, and Pine Creek.

2.0 PURPOSE AND SCOPE

The purpose of the FSP08 sampling effort was to provide data from samples collected within the South Fork of the Coeur d'Alene River Basin (SFCDRB) primarily upstream of Bunker Hill superfund site to help evaluate remedial design alternatives for a feasibility study.

The scope of this field effort consisted of 4 tasks:

- Task 1 – Drilling of exploratory borings in waste piles, valley fill, and embankments to be advanced until bedrock was reached. Collection of subsurface soil samples and lithologic information.

- Task 2 – Installation of monitoring wells where exploratory borings were drilled or piezometers where test pits were excavated. Determination of depth to groundwater in the monitoring wells and adjacent surface water elevations and collection of groundwater samples.

- Task 3 – Collection of surface soil samples from selected floodplain and waste pile areas within the SFCDR basin.

- Task 4 – Collection of surface water samples from Canyon Creek, Ninemile Creek, Pine Creek, and McFarren Gulch. Collection of limited geomorphic observations in areas where monitoring wells were installed and stream samples collected.

3.0 ALTERATIONS BY TASK

The following subsections provide a brief summary of the task, deviations to the task, and the impact of the deviations on the study.

3.1 TASK 1 – EXPLORATORY BORINGS

A total of 35 exploratory borings were drilled at Canyon Creek, 14 at Ninemile Creek and 1 at Pine Creek. A total of 77 subsurface soil samples were sent for analysis by the following methods: IN-CLP, acid base accounting, pH (9045) and inorganic ions (300.0). Additional samples were collected and archived. Table 1 and Appendix A show the final monitoring well and piezometer locations.

Deviation:

Only three of the subsurface soil samples collected from each boring or excavation were submitted for analysis (refer to Tech Memo 1 dated 10/28/98, Attachment B). The remaining samples were archived, these samples are stored in clearly marked coolers located at the URSG storage facility in Seattle, Washington (refer to Tech Memo 2 dated 10/28/98 and Tech Memo 4 dated 11/06/98, Appendix B).

Impact: None expected.

Deviation:

Subsurface conditions required the use of air rotary for drilling at most locations. This resulted in the inability to collect some of the subsurface soil samples using a split spoon sampler. Where possible, samples of drill cuttings were collected.

Impact: None expected.

Deviation:

In some cases, because of insufficient volume or shallow borings, the proposed number of subsurface soil samples were not collected. Geologic logs were prepared based on information collected during drilling.

Impact: None expected.

Deviation:

Two coolers of subsurface soil samples were shipped to the CLP laboratories on 11/02/98. The CLP inorganic traffic reports (ITRs) were placed in the incorrect coolers. Inchcape received two ITRs that identified samples shipped to Analytical Resources, Inc. (ARI). Alternatively, ARI received two ITRs that identified samples shipped to Inchcape. The laboratories notified the contact at Dyncorp (CLP laboratory contract contact) of the error. Following conversations between Dyncorp, the EPA RSCC, and the URSG field personnel, the error was corrected. Dyncorp faxed the CLP labs the appropriate ITRs and the CLP laboratories exchanged the original ITRs.

Impact: None expected.

3.2 TASK 2 – MONITORING WELLS

Monitoring wells or piezometers were installed where exploratory borings were drilled. The total number of monitoring wells installed included: 34 in Canyon Creek, 8 in Ninemile Creek, and 1 in Pine Creek. Appendix A contains the location maps for these monitoring wells. Piezometers were installed in test pits or exploratory borings: 1 in Canyon Creek and 6 in Ninemile Creek. Table 1 summarizes general information for the monitoring wells and piezometers installed during FSP 8.

Deviation:

Under technical direction from EPA, slug testing was postponed until receipt of groundwater sample analysis.

Impact:

Flow data at monitoring well locations will not be acquired until the next field sampling plan addendum (probably fall 1999).

Deviation:

The proposed drilling in the Hecla-Star tailings ponds located along Canyon Creek was eliminated to avoid concern over penetrating a lining, if present. Instead, wells were installed adjacent to the inactive ponds and downstream of the repository (located east of Canyon Creek in the same reach of the stream). Samples from these locations will provide data concerning potential discharge from the ponds and repository.

Impact:

The installed wells will be used to help assess water quality and the need to drill through the ponds. If the installed wells do not provide sufficient information on water quality additional drilling may be recommended.

Deviation:

A drill rig was not able to access the Success waste rock pile along Ninemile Creek, therefore no monitoring wells were installed at this location. Alternatively, a backhoe was used to dig test pits to allow geologic evaluation of the waste rock material. Piezometers were installed in each of the five test pits excavated on the Success site (refer to Tech Memo 3 dated 11/03/98, Appendix B).

Impact:

Limited subsurface information was obtained to characterize the dump. The data obtained will need to be evaluated to assess the need for additional subsurface information to support the feasibility study (FS).

Deviation:

The protocol for collecting groundwater samples and field measurement data was revised based on the preliminary data collected during drilling and development (refer to Tech Memo 8 dated 12/01/98, Appendix B). Based on this protocol, field measurements were collected from three depths in each well; 2 feet below the static water level, 8 feet below the static water level, and 2 feet above the well bottom. The protocol identified which depths were to be included in groundwater sampling. In some wells, the water column did not allow for samples to be collected at the specified depths. In those cases, the field measurements and sampling depths were modified to allow for three discrete (where possible) sampling locations.

Impact: None expected.

Deviation:

In early December, demolition of the Rex mill buildings by the property owner resulted in the inadvertent destruction of the above ground monument for monitoring well NM 421. This well monument has not been replaced.

Impact:

A new well may be needed.

3.3 TASK 3 – GROUND SURFACE SOIL SAMPLING

Surface soil samples were collected from 22 locations on Canyon Creek, 17 locations on Ninemile Creek, and 5 locations at the Old Mullan Dump. These locations included waste piles, tailings piles, remediated floodplains, railroad embankment material, and dump. Table 2 provides a list of the surface soil sample locations, site number, and sample type.

Deviation:

Two additional samples (NM 461 and NM 462) were collected from the waste rock around the Rex Millsite.

Impact: None expected.

Deviation:

No surface soil samples within the remediated floodplain between Wallace and Elizabeth Park were collected. These samples were eliminated from the scope of this field sampling effort. The need for these samples will be evaluated for inclusion in a later field sampling effort.

Impact: None expected.

3.4 TASK 4 – SURFACE WATER SAMPLING

Surface water samples were collected from 59 locations on Canyon Creek (26 locations), Ninemile Creek (26 locations), Pine Creek (2 locations), and McFarren Gulch (5 locations). A total of 91 samples were collected for analysis. The water samples were analyzed by methods DIN-CLP-LOW, IN-CLP-LOW, total dissolved solids (160.1), total suspended solids (160.2), inorganic ions (300.0) and sulfide (376.1). Table 3 provides a list of the surface water sample location descriptions, site number, and sample type.

Deviation:

Several surface water sampling locations identified in the original FSP 8 were not sampled due to inability to access the site (upper reaches of McFarren Gulch) or the absence of surface water (dry streambed).

Impact:

If metal concentrations are elevated in surface water, additional sampling/gauging may be recommended.

Deviation:

A revised list of surface water sampling locations was provided to the field crews (refer to Tech Memo 5 dated 11/11/98 and Tech Memo 6 dated 11/13/98, Attachment B). The revised surface water sample locations provided stream coverage required to collect surface water data near the monitoring wells. In addition, the revised list eliminated repetitive sampling locations.

Impact: None.

Deviation:

The sampling effort performed on Canyon Creek and Ninemile Creek followed the protocol established. However, the last stream location (sampled the previous day) was re-gauged to establish changes in stream conditions overnight. This was not done for McFarren Gulch or Pine Creek because the sampling of those streams were each completed in one day.

Impact: None.

Deviation:

Surface water sampling locations 442 and 275 on Canyon Creek were not sampled. Location 442 was deleted as it was determined to be redundant with location 485. Location 275 was dry.

Impact: None expected.

Deviation:

Sampling of the lower portion of Ninemile Creek was not completed in November. Remedial activities (heavy equipment operations) in the upper reaches of Ninemile Creek, at the Tamarack and Interstate-Callahan millsites, increased the suspended solids. These suspended sediment loads in the stream did not allow for the collection of representative stream samples. The upper portion of Ninemile Creek was sampled on a day with no remedial activity. The lower portion of Ninemile Creek was sampled after remedial activities in the upper reach of the creek had ceased.

Impact:

Future low-flow gauging may be recommended to continue a monitoring record for the lower portions of Ninemile Creek.

4.0 ADMINISTRATIVE ALTERATIONS

Changes to the contacts listed in FSP 8 included the addition of the URSG Task Lead (Steven Hughes), change in URSG RAP Project Manager (David Mohr was replaced by Todd Goins), and change in URSG Field Leads (Thom Booth was replaced by Robin Hamlet). The Field Contact Number for the URSG Kellogg office was changed to 208-786-1401 (a direct line to URSG). An alternative fax number for the URSG field office is 208-783-4561 (IDEQ fax number).

The original project schedule anticipated fieldwork to occur from October 12, 1998 through November 6, 1998. The drilling activities were initiated on October 23, 1998, and completed on November 18, 1998. Development of these wells was initiated on November 4, 1998, and completed on November 20, 1998. Sampling of the groundwater wells was initiated on December 1, 1998, and completed on December 9, 1998. Surface water sampling of McFarren Gulch, Canyon Creek, Ninemile Creek, and Pine Creek was performed during November and December.

5.0 TECHNICAL MEMORANDA

During the execution of this field effort, technical memoranda were provided to the field crews detailing specific changes to the original work plan. These technical memoranda were prepared by the URSG Task Lead, approval was received from the EPA Tier 2 Management Lead, and submitted to the URSG Field Lead for implementation. A summary of the technical memoranda follow and copies of the detailed instructions are provided as Attachment A.

- Tech Memo 1: 10/28/98 - Drilling and soil sampling specifications. Guidance for drilling and logging soil samples, piezometer construction, monitoring well installation and development, test pit notations, location and matrix type designations, and soil sampling methods.

- Tech Memo 2: 10/28/98 - Collection of archive samples during drilling. Samples collected at five-foot intervals will be archived if the sample is not submitted to the laboratory for chemical analysis.

- Tech Memo 3: 11/03/98 - Detailed instructions for test pit excavation at the Success Mine Dump. Drilling at this location was not possible because the drill rig was not able to drive to the site. Five test pits were to be excavated and piezometers installed.

- Tech Memo 4: 11/06/98 - Clarification of location types and handling of archive samples. Archive samples were collected from test pits and during drilling, specific instructions concerning the archive procedure were presented. Sample location type designation for piezometers was specified.

- Tech Memo 5: 11/11/98 - Surface water sample locations on Canyon Creek. A total of 28 surface water locations were identified for sampling. Several of these locations will be resampled during groundwater sampling.

- Tech Memo 6: 11/13/98 - Surface water sample locations on Ninemile Creek. A total of 26 surface water locations were identified for sampling. Several of these locations will be resampled during groundwater sampling.

- Tech Memo 7: 11/16/98 - Details for conducting hydrologic and geomorphologic assessment of selected locations on Canyon and Ninemile Creeks.

- Tech Memo 8: 12/01/98 - Groundwater sampling protocol. Details for collection of groundwater parameters during low flow purging of each well at three distinct depths (2 feet below static water level, 8 feet below static water level, and 2 feet above bottom of well). Specific instructions for collection of groundwater samples in each well. Wells were identified for parameters only or groundwater samples at some or all depths.

6.0 REFERENCES

URS Consultants, Inc. (URS). 1997a. *Generic Field Sampling Plan and Generic Quality Assurance Project Plan for the Bunker Hill Facility Project.* Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0054.

———. 1997b. *Health and Safety Plan for the Bunker Hill Facility Project.* Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0054.

URS Greiner, Inc. (URSG). 1998a. *Field Sampling Plan for the Bunker Hill Basin-Wide RI/FS Addendum No. 8 – Tier 2 Source Area Characterization.* Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0054. October 2, 1998.

———. 1998b. *Draft Field Sampling Plan and Quality Assurance Project Plan Addenda for the Bunker Hill Basin-Wide RI/FS Addenda 4 – Adit Drainage, Seep, and Creek Surface Water Sampling: Spring 1998 High Flow Event.* Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0054. April 24, 1998.

Table 1
Monitoring Wells, Piezometers, and Domestic Well Summary Information

Site	Location	Type	Total Depth (ft btoc)	Screened Interval (ft bgs)	Depth to Water (ft btoc)	General Location
CC	401	MW	23.53	5-20	13.54	Hercules No. 5
CC	402	MW	34.51	10-35	12.96	Hercules No. 5
CC	403	MW	25.41	7.5-22.5	11	Hercules No. 5
CC	409	MW	32.12	3.5-28.5	12.61	Burke
CC	414	MW	24.15	5-20	7.2	Burke
CC	415	MW	23.31	5-20	11.88	Burke
CC	417	MW	19.42	5-20	3.36	pre-Burke
CC	418	MW	42.38	3.5-38.5	13.2	pre-Burke
CC	419	MW	39.82	10-40	9.27	pre-Burke
CC	422	MW	20.35	5-20	8.1	pre-Burke
CC	423	MW	15.04	5-10	7.83	Tamarack No. 7
CC	431	MW	97.7	10-95	74.16	Tamarack No. 7
CC	432	MW	33.25	10-30	32.51	Tamarack No. 7
CC	433	MW	48.58	5-45	10.84	Tamarack No. 7
CC	434	MW	28.4	5-25	9.63	Tamarack No. 7
CC	437	MW	136.36	42-132	114.11	Tamarack No. 7
CC	440	MW	31.06	7-27	11.04	Frisco
CC	441	MW	30.22	4.9-29.9	8.57	Gem
CC	449	MW	38.25	9-34.5	11.73	Gem
CC	451	MW	38.8	4-39	10.23	Gem
CC	452	MW	44.96	10-45	5.68	Gem
CC	453	MW	34.78	5.9-30.9	10.18	Gem
CC	456	MW	29.8	4.8-29.8	6.12	Woodland Park
CC	459	MW	47.7	5-30	20.16	Hecla Tailings Pond
CC	460	MW	49.57	5-50	10.72	Hecla Tailings Pond
CC	462	MW	33.17	5-30	5	Hecla Tailings Pond
CC	463	MW	63.3	10-65	11.08	Hecla Tailings Pond

Table 1 (Continued)
Monitoring Wells, Piezometers, and Domestic Well Summary Information

Site	Location	Type	Total Depth (ft btoc)	Screened Interval (ft bgs)	Depth to Water (ft btoc)	General Location
CC	464	MW	64.06	10-60	17.01	Hecla Tailings Pond
CC	465	MW	53.66	5-50	6.64	Hecla Tailings Pond
CC	467	MW	45	5-45	7.52	Woodland Park
CC	468	MW	40	5-40	4.94	Woodland Park
CC	469	MW	43.7	4.9-39.9	6.34	Woodland Park
CC	480	MW	13.62	3.7-13.7	9.58	I-90
CC	481	MW	23.39	5-20	9.97	I-90
CC	1000	PZ	33.06	5-30	12.04	Tamarack No. 7
NM	421	MW	23.75	5-20	dry	Rex
NM	422	MW	22.6	5-20	14.73	Rex
NM	423	MW	19.68	5-20	dry	Rex
NM	424	PZ	3	0-3	unknown	Success
NM	425	PZ	4	0-4	unknown	Success
NM	426	PZ	14.1	0-14.1	unknown	Success
NM	427	PZ	9.1	0-9.1	unknown	Success
NM	428	PZ	15	0-15	unknown	Success
NM	441	MW	45	10-45	10.39	Zanettiville
NM	442	MW	36.85	5-35	9.6	Zanettiville
NM	444	MW	79.75	12-77	74.84	Rex
NM	458	MW	32.97	5-34	5.32	Sierra Silver
NM	459	MW	29.43	5-30	5.66	Sierra Silver
NM	1001	PZ	15.27		dry	Rex
PC	101	DW	residential well			Pinehurst
SF	432	MW	59.45	10-60	16.75	Pinehurst

Notes:
BLM - Bureau of Land Management
bgs - below ground surface
btoc - below top of casing
CC - Canyon Creek
DW - domestic well

Table 1 (Continued)
Monitoring Wells, Piezometers, and Domestic Well Summary Information

ft - feet
MW - monitoring well
NM - Ninemile Creek
PC - Pine Creek
PZ - piezometer
SF - South Fork of the Coeur d'Alene River
UPRR - Union Pacific Railroad

Table 2
Surface Soil Sample Locations

Site	Location	Type	General Location
CC	404	GS	Hercules No. 5 Waste Pile
CC	405	GS	Hercules No. 5 Waste Pile
CC	406	GS	Hercules No. 5 Waste Pile
CC	407	GS	Hercules No. 5 Waste Pile
CC	408	GS	Hercules No. 5 Waste Pile
CC	426	GS	Tamarack No. 7 Waste Pile
CC	427	GS	Tamarack No. 7 Waste Pile
CC	428	GS	Tamarack No. 7 Waste Pile
CC	429	GS	Tamarack No. 7 Waste Pile
CC	430	GS	Tamarack No. 7 Waste Pile
CC	446	GS	Floodplain remediation near Frisco
CC	447	GS	Floodplain remediation near Frisco
CC	470	GS	Floodplain remediation near Star Tailings Ponds
CC	471	GS	Floodplain remediation near Star Tailings Ponds
CC	472	GS	Floodplain remediation near Star Tailings Ponds
CC	473	GS	Floodplain remediation near Star Tailings Ponds
CC	474	GS	Floodplain remediation near Star Tailings Ponds
CC	475	GS	Floodplain remediation near Star Tailings Ponds
CC	476	GS	Floodplain remediation near Star Tailings Ponds
CC	477	GS	Floodplain remediation near Star Tailings Ponds
CC	478	GS	Floodplain remediation near Star Tailings Ponds
CC	479	GS	Floodplain remediation near Star Tailings Ponds
NM	413	GS	Rex Tailings Pile
NM	414	GS	Rex Tailings Pile
NM	415	GS	Rex Tailings Pile
NM	416	GS	Rex Tailings Pile
NM	417	GS	Rex Tailings Pile
NM	461	GS	Rex Waste Pile
NM	462	GS	Rex Waste Pile
NM	429	GS	Success Waste Pile
NM	430	GS	Success Waste Pile

Table 2 (Continued)
Surface Soil Sample Locations

Site	Location	Type	General Location
NM	431	GS	Success Waste Pile
NM	432	GS	Success Waste Pile
NM	433	GS	Success Waste Pile
NM	453	GS	Railroad Embankment Material
NM	454	GS	Railroad Embankment Material
NM	455	GS	Railroad Embankment Material
NM	456	GS	Railroad Embankment Material
NM	457	GS	Railroad Embankment Material
SF	401	GS	Mullan Dump
SF	402	GS	Mullan Dump
SF	403	GS	Mullan Dump
SF	404	GS	Mullan Dump
SF	405	GS	Mullan Dump

Notes:
CC - Canyon Creek
GS - ground surface
NM - Ninemile Creek
SF - South Fork Coeur d'Alene River

Table 3
Surface Water Sample Locations
(listed in upstream order)

Site	Location	Type	General Location
CC	288	RV	Frontage bridge road north of I-90
CC	482	RV	Mouth of Canyon Creek
CC	457	RV	Star Tailings Ponds
CC	286	RV	Below Star Tailings Ponds
CC	17	RV	Between Star Tailings Ponds
CC	455	RV	Star Tailings Ponds
CC	454	RV	Gem
CC	484	RV	Gem
CC	282	RV	Below Gem Mine, wooden bridge
CC	444	RV	Frisco-Black Bear
CC	443	RV	Frisco-Black Bear
CC	486	RV	Frisco-Black Bear
CC	485	RV	Frisco-Black Bear
CC	439	RV	Tamarack No. 7
CC	436	RV	Tamarack No. 7
CC	438	RV	Tamarack No. 7
CC	425	RV	Tamarack No. 7
CC	280	RV	Downstream from Tamarack No. 7
CC	279	RV	Highway 4 at Tamarack No. 7
CC	421	RV	Mace
CC	420	RV	Mace
CC	277	RV	West side of Hecla-Star Mill
CC	276	RV	Tiger Poorman/Hecla Star Mill
CC	411	RV	Tiger Poorman
CC	392	RV	Tiger Poorman
CC	410	RV	Tiger Poorman
NM	305	RV	NM south of Depot Recreational Vehicle park
NM	460	RV	Mouth of Ninemile Creek
NM	304	RV	Mouth of Ninemile Creek
NM	303	RV	NM above McCarthy

Table 3 (Continued)
Surface Water Sample Locations
(listed in upstream order)

Site	Location	Type	General Location
NM	302	RV	Black Cloud Creek, before confluence with NM
NM	301	RV	NM at Zanettiville
NM	452	RV	Dayrock
NM	450	RV	Dayrock
NM	448	RV	Dayrock
NM	443	RV	Dayrock
NM	8	RV	WFNM 75 yds below fish pond
NM	297	RV	EFNM below tailings dump, Dayrock
NM	296	RV	EFNM at Success tailings dump
NM	440	RV	Success
NM	439	RV	Success
NM	438	RV	Success
NM	437	RV	Success
NM	436	RV	Success
NM	435	RV	Success
NM	295	RV	500 yards upstream from adit
NM	412	RV	Rex
NM	411	RV	Rex
NM	294	RV	Rex tributary, west side
NM	293	RV	EFNM, below Rex tailing dump
NM	292	RV	EFNM, above Wilson Creek
NM	291	RV	Wilson Creek
PC	100	RV	Amy-Matchless Millsite
PC	313	RV	Locate near monitoring well SF432, near Silver Valley Road
SF	426	RV	MFG - further below tributary 1
SF	427	RV	MFG - above confluence with WFMFG
SF	429	RV	WFMFG above confluence with MFG
SF	430	RV	MFG - below confluence with WFMFG
SF	431	RV	MFG - below Coeur Millsite

Table 3 (Continued)
Surface Water Sample Locations
(listed in upstream order)

Notes:
CC - Canyon Creek
EFNM - East Fork Ninemile Creek
MFG - McFarren Gulch
PC - Pine Creek
RV - river
SF - South Fork of the Coeur d'Alene River
WFMFG - West Fork of McFarren Gulch
WFNM - West Fork Ninemile Creek

APPENDIX A

MONITORING WELL SITE LOCATION MAPS

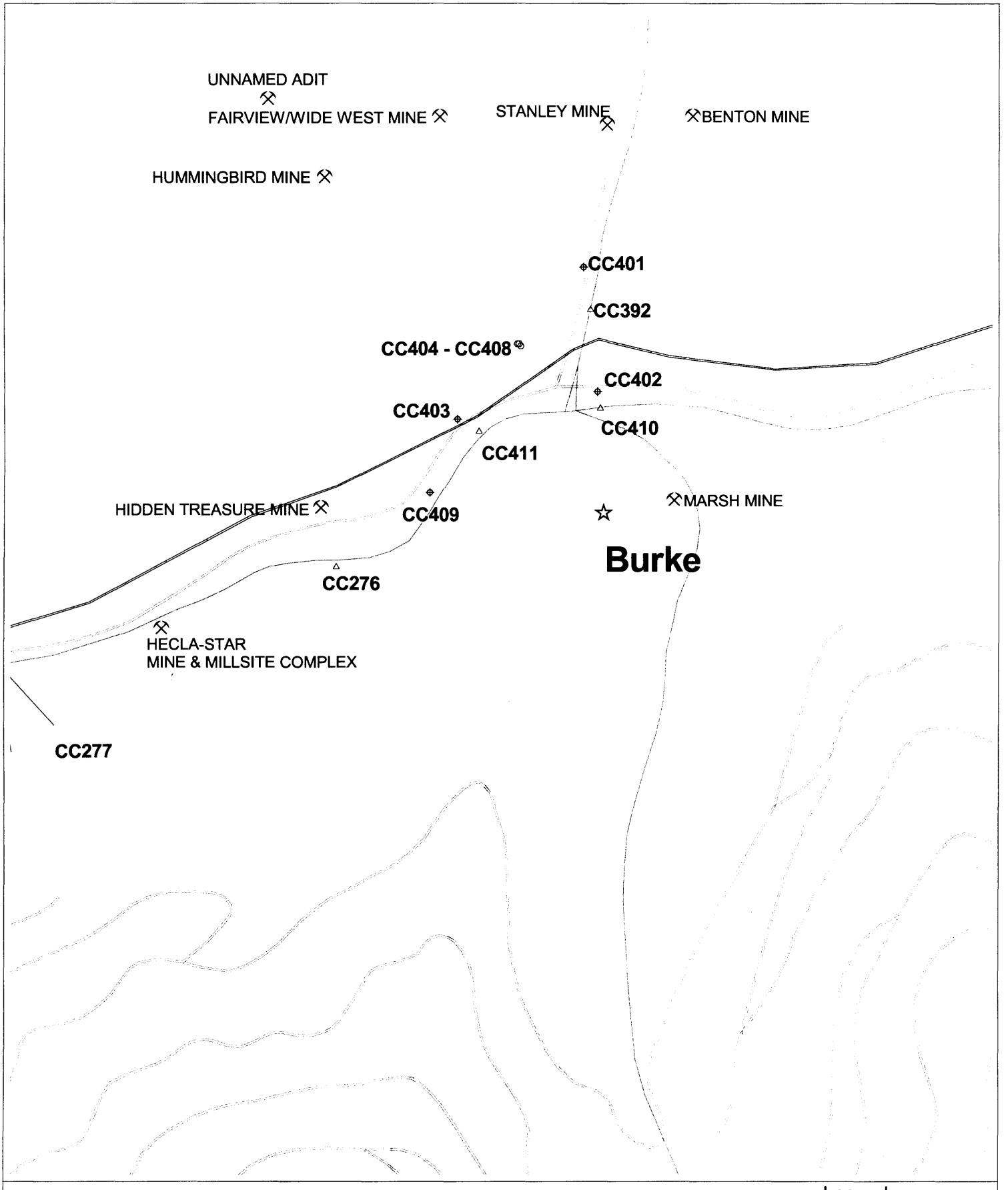


Figure A-1
Tiger-Poorman Reach
Canyon Creek Drainage Basin

n:\projects\fsp08_draft_fsp
Layout:figa-2

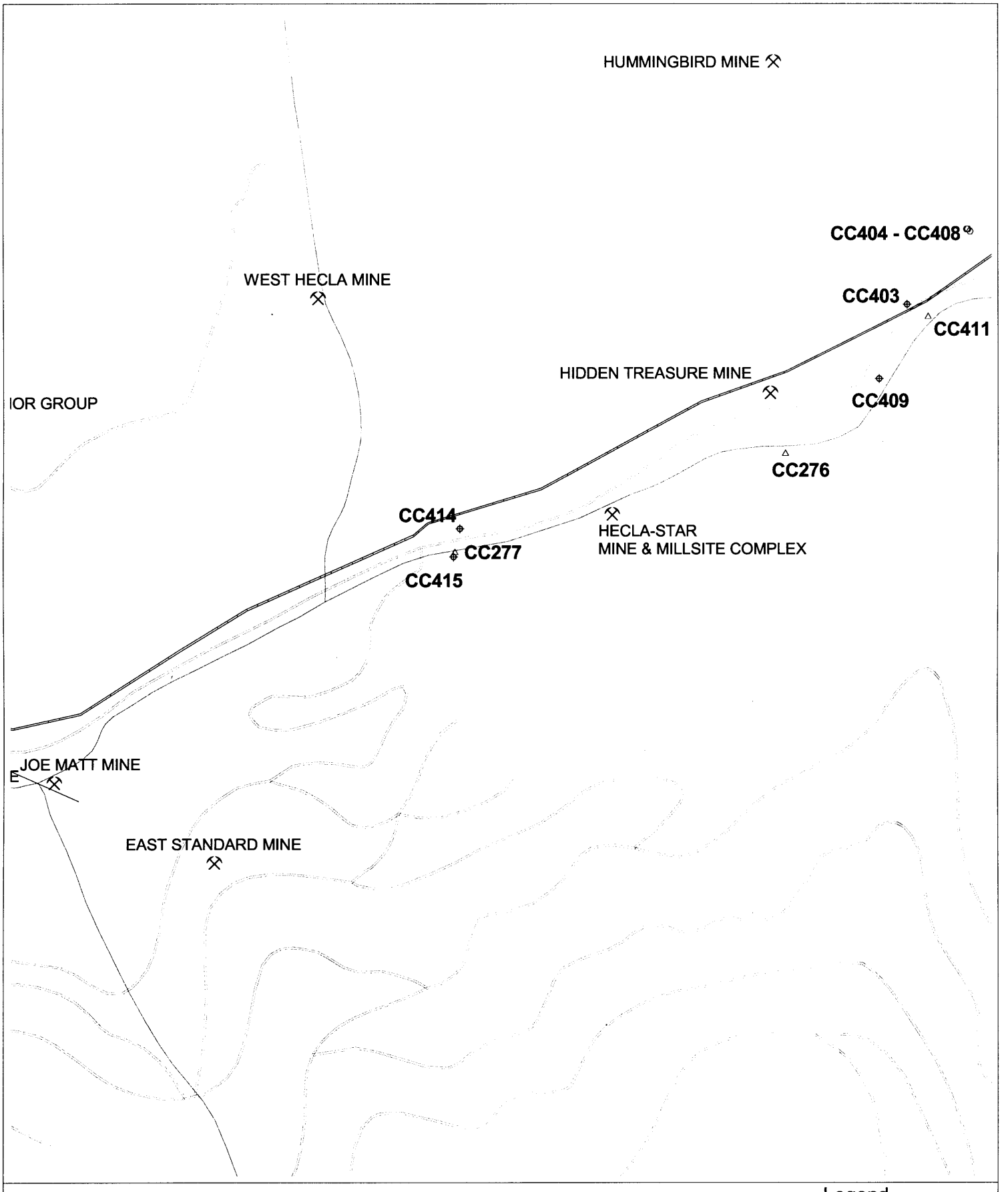


Figure A-2
Hecla-Star Reach
Canyon Creek Drainage Basin

n:\projects\fsp08_draft_fsp
Layout:figa-2

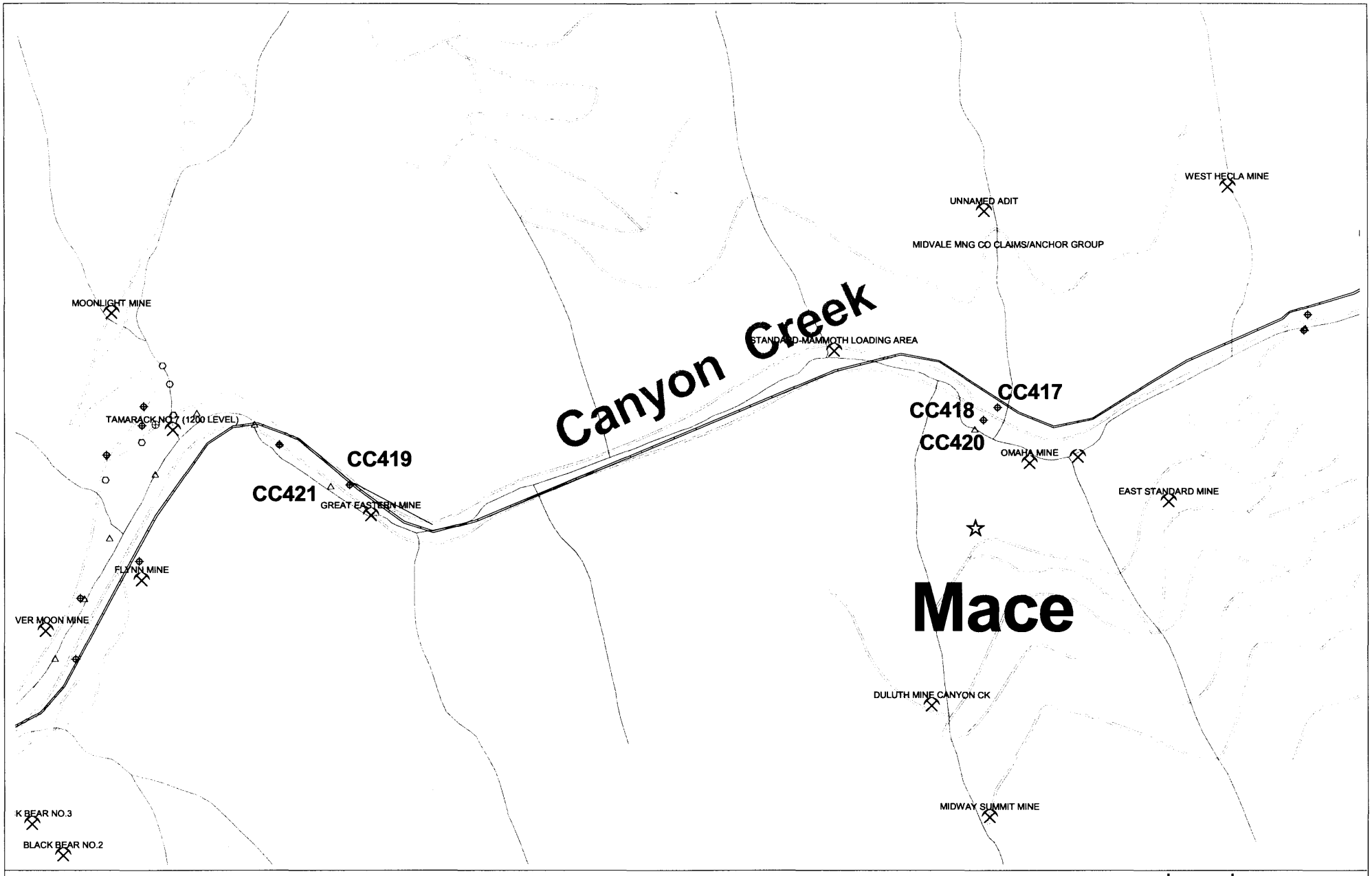


Figure A-3
Mace Reach
Canyon Creek Drainage Basin

n:\projects\fsp08_draft_fsp
Layout:figa-3

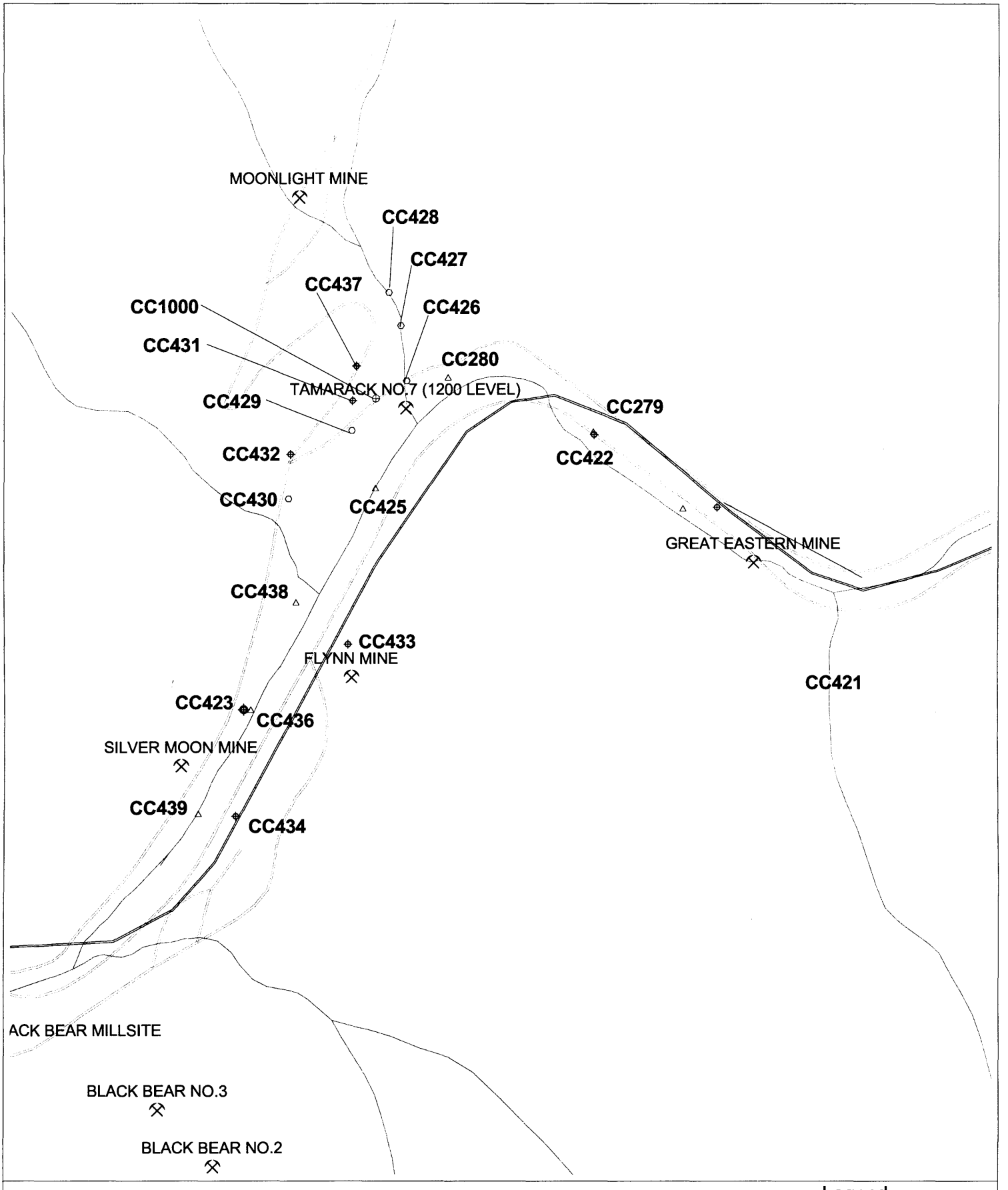


Figure A-4
Tamarack No. 7 Reach
Canyon Creek Drainage Basin

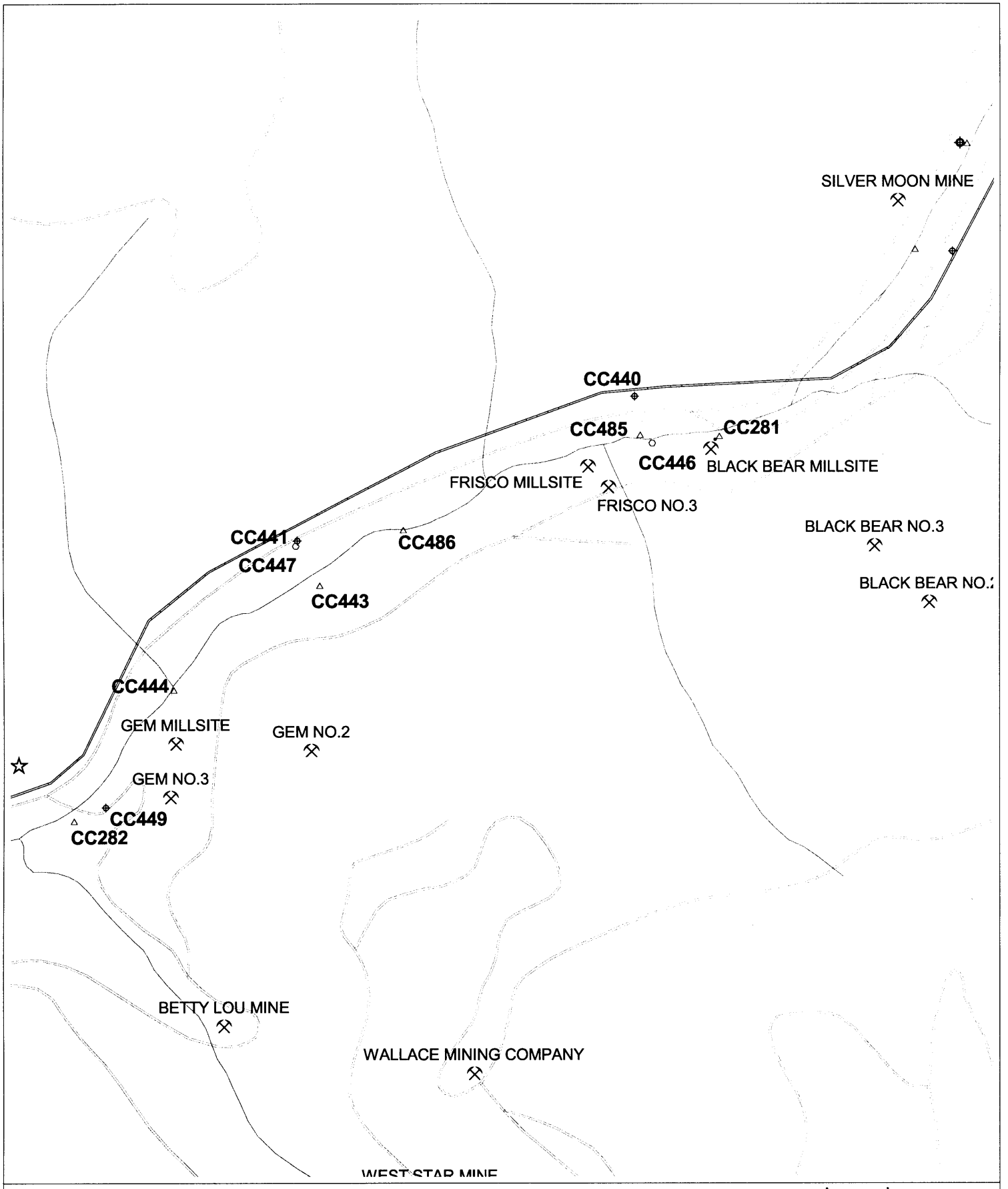


Figure A-5
Frisco-Black Bear Reach
Ninemile Creek Drainage Basin

n:\projects\fsp08_draft_fsp
view FSP08-1
Layout:figa5

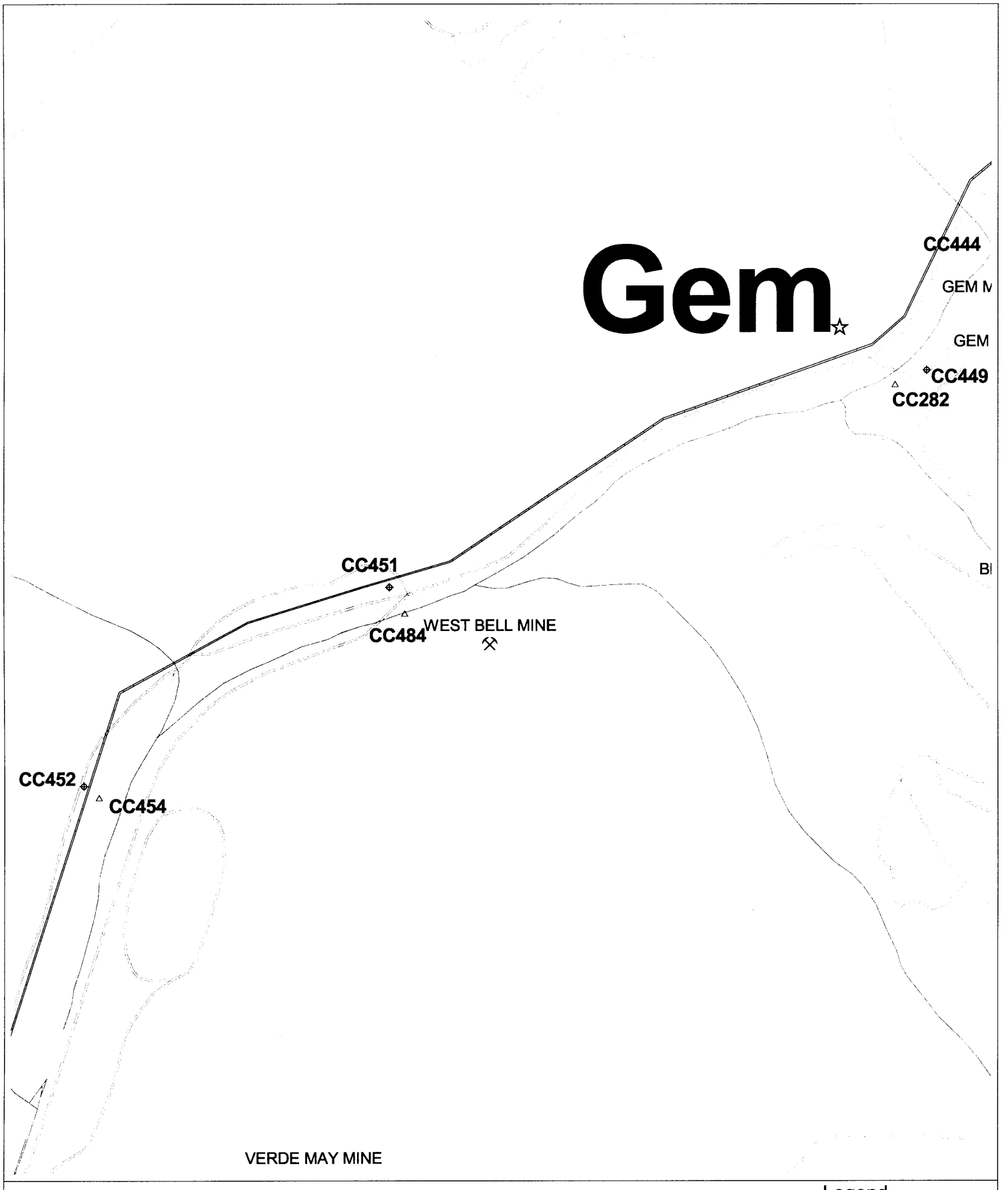


Figure A-6
Gem Reach
Canyon Creek Drainage Basin

n:\projects\fsp08_draft_fsp
view FSP08-1
Layout:figa-6

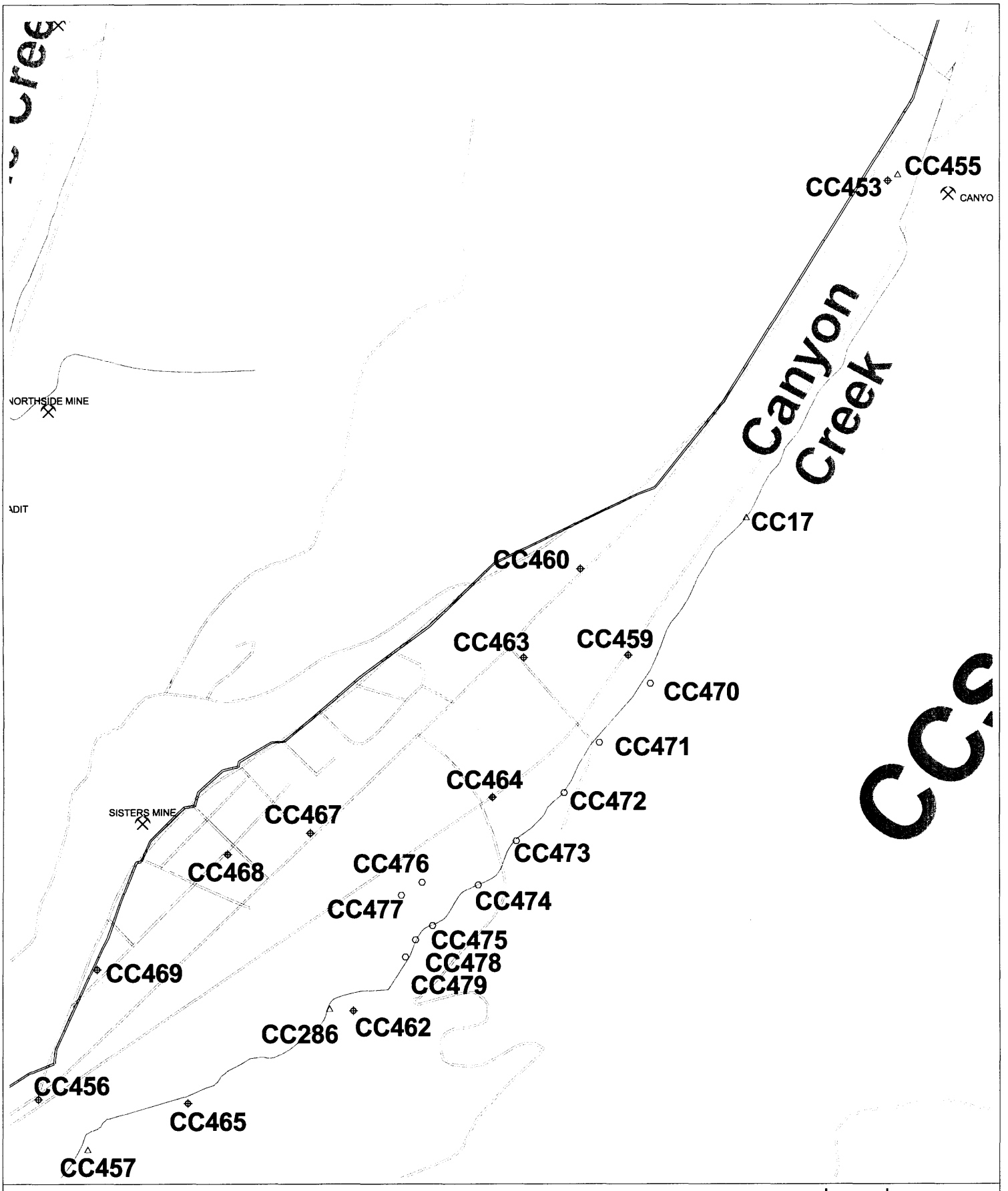
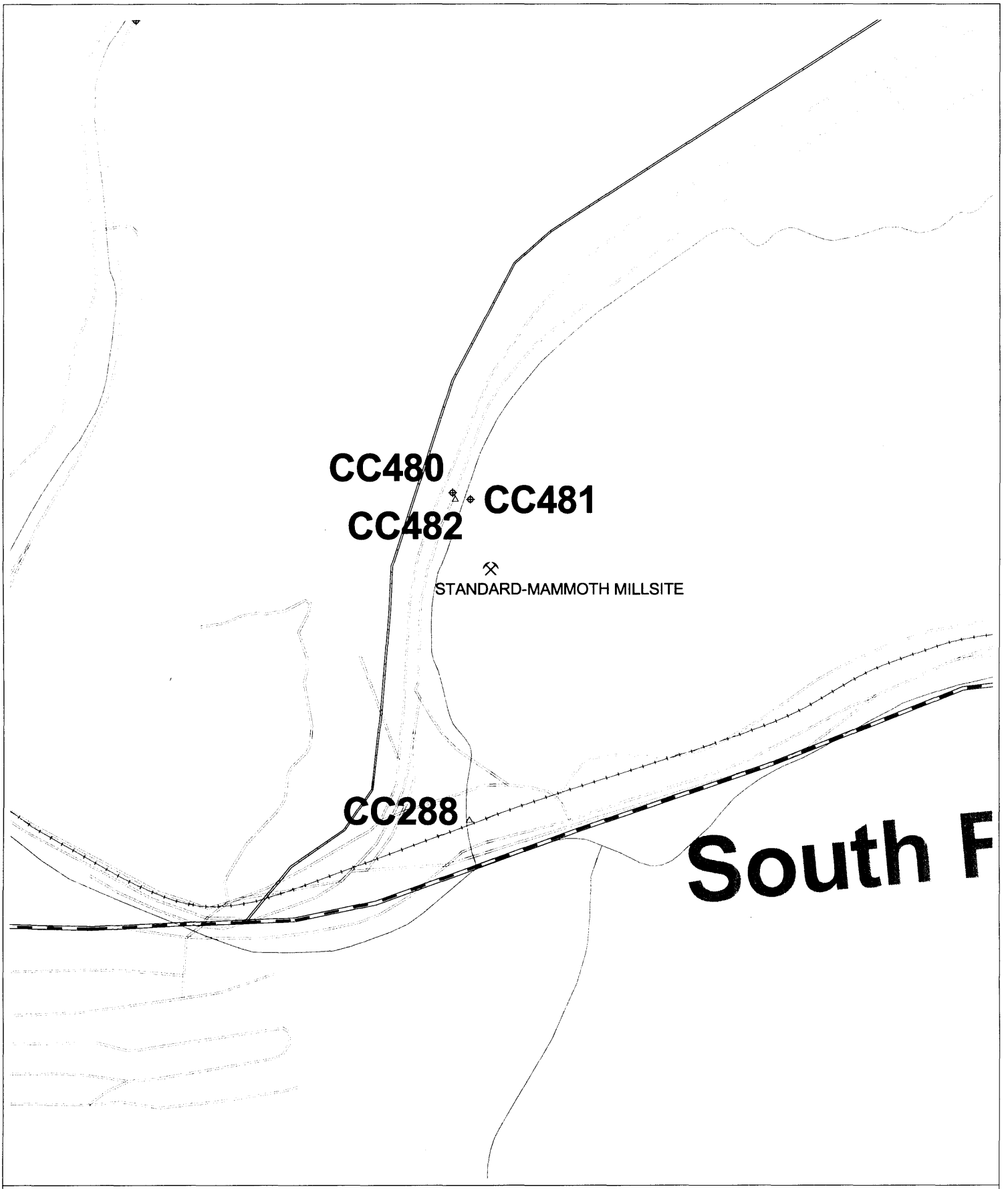


Figure A-7
Star Tailings Ponds Reach
Canyon Creek Drainage Basin

n:\projects\fsp08_draft_fsp
view FSP08-1
Layout:figa7



0 500 Feet

Figure A-8
Mouth of Canyon Creek
Canyon Creek Drainage Basin

Legend

- Ground Surface Sample (Soil/Sediment)
- River Sample Location (Water)
- Piezometer
- Monitoring Well
- Stream Guage Location
- Cities
- Streams
- Interstate 90
- Roads
- River Segment Zones

n:\projects\fsp08_draft_fsp
view FSP08-1
Layout:figa8

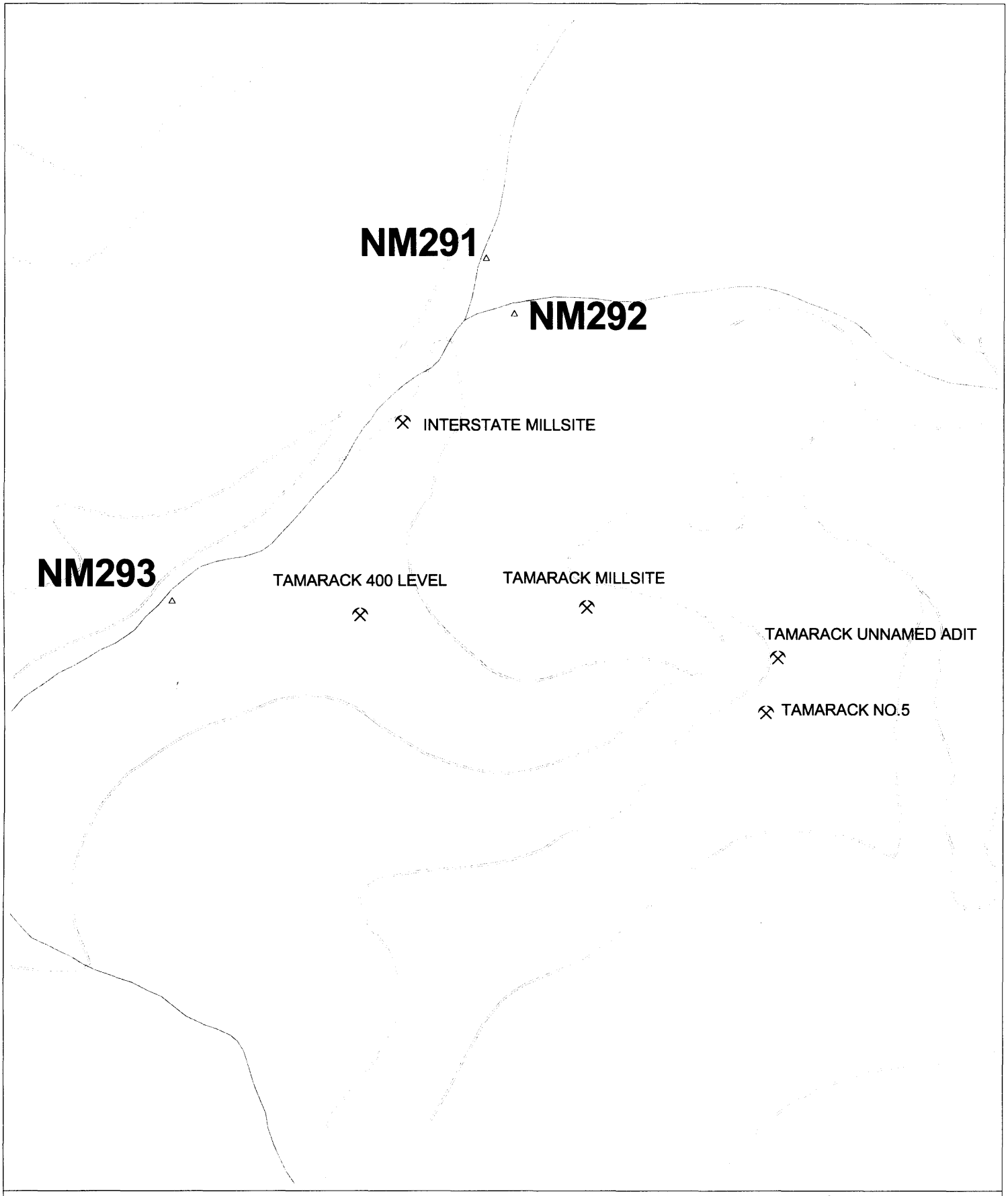


Figure A-9
Tamarack Reach
Canyon Creek Drainage Basin

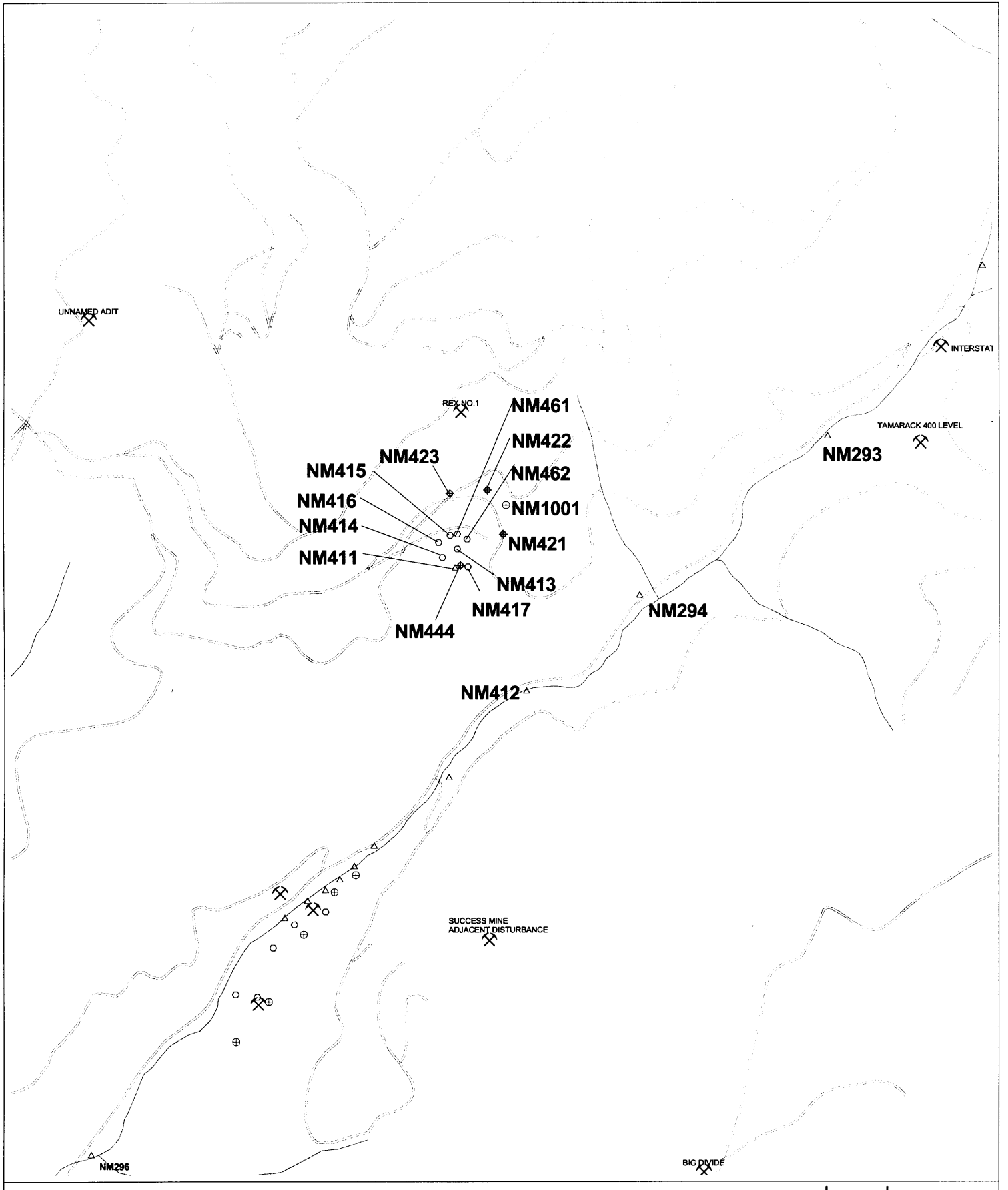
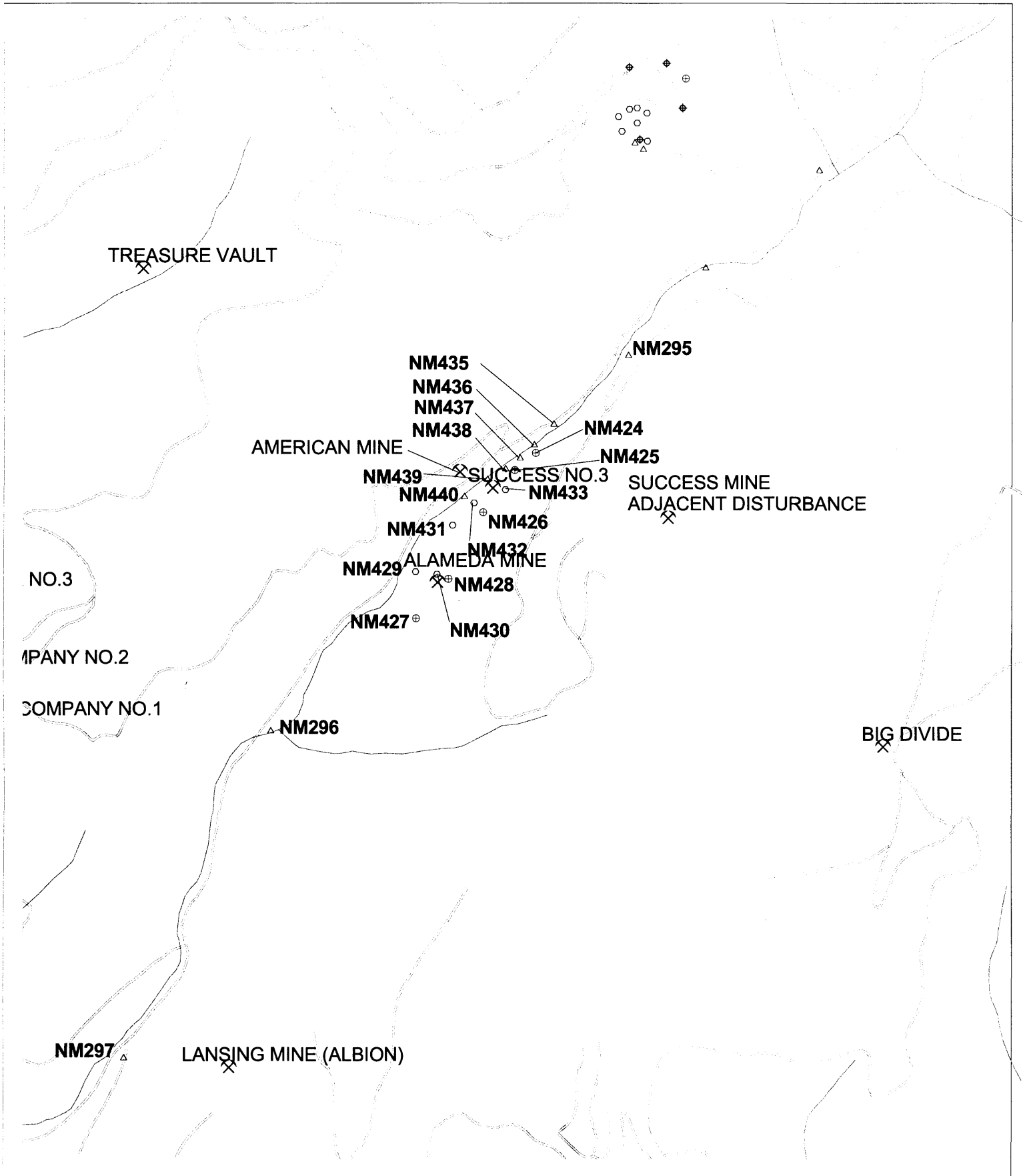
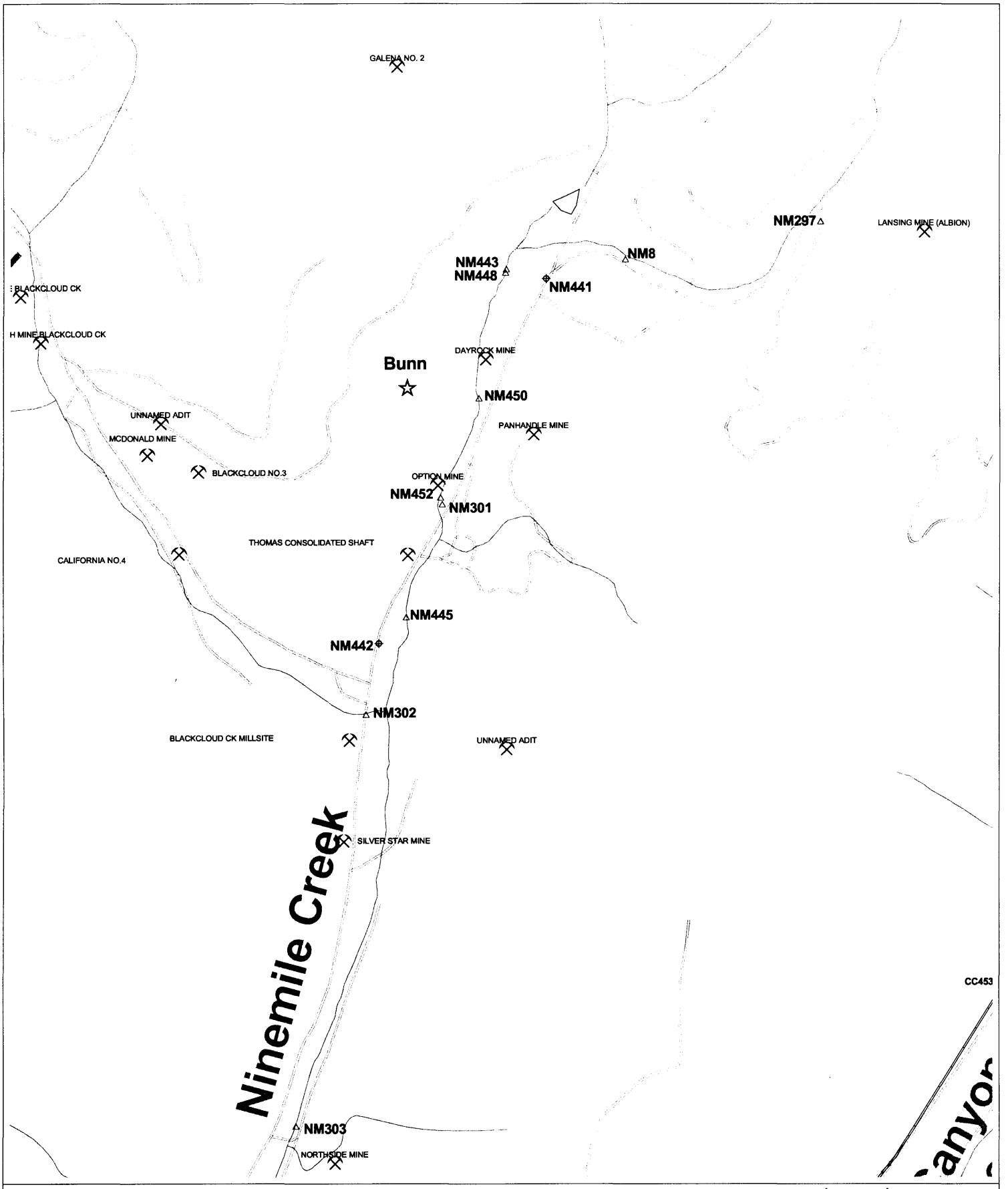


Figure A-10
Rex Reach
Ninemile Creek Drainage Basin


TREASURE VAULT
NM295
NM435
NM436
NM437
NM438
NM424
AMERICAN MINE
NM425
NM439
SUCCESS NO.3
SUCCESS MINE
ADJACENT DISTURBANCE
NM440
NM433
NM431
NM426
NM432
ALAMEDA MINE
NM429
NM428
NO.3
NM427
NM430
IPANY NO.2
COMPANY NO.1
NM296
BIG DIVIDE
NM297
LANSING MINE (ALBION)
N
0
1000 Feet
n:\projects\fsp08_draft_fsp
view FSP08-1
Layout:figa11
Figure A-11
Success Reach
Ninemile Creek Drainage Basin
Legend
Ground Surface Sample (Soil/Sediment)
River Sample Location (Water)
Piezometer
Monitoring Well
Stream Guage Location
Cities
Streams
Interstate 90
Roads
River Segment Zones


GALENA NO. 2
NM297
LANSING MINE (ALBION)
NM443
NM448
NM8
NM441
BLACKCLOUD CK
H MINE BLACKCLOUD CK
DAYROCK MINE
Bunn
NM450
UNNAMED ADIT
MCDONALD MINE
PANHANDLE MINE
BLACKCLOUD NO.3
OPTION MINE
NM452
NM301
THOMAS CONSOLIDATED SHAFT
CALIFORNIA NO.4
NM445
NM442
NM302
BLACKCLOUD CK MILLSITE
UNNAMED ADIT
SILVER STAR MINE
Ninemile Creek
CC453
NM303
NORTHSIDE MINE
N
0
1000 Feet
n:\projects\fsp08_draft_fsp
view FSP08-1
Layout:figa12
Figure A-12
Dayrock Reach
(within Lower NMC Valley)
Ninemile Creek Drainage Basin
Legend
Ground Surface Sample (Soil/Sediment)
River Sample Location (Water)
Piezometer
Monitoring Well
Stream Guage Location
Cities
Streams
Interstate 90
Roads
River Segment Zones

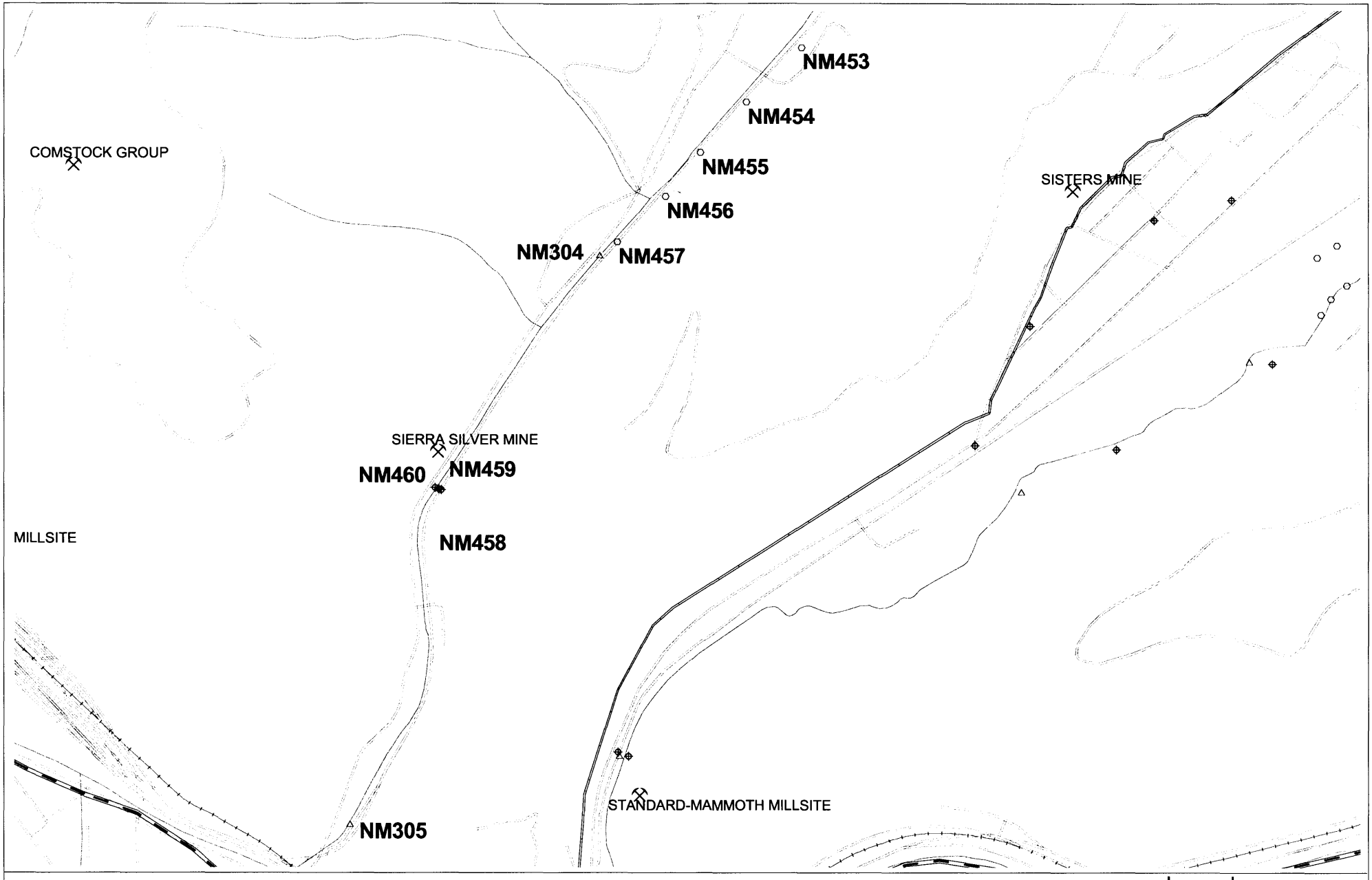
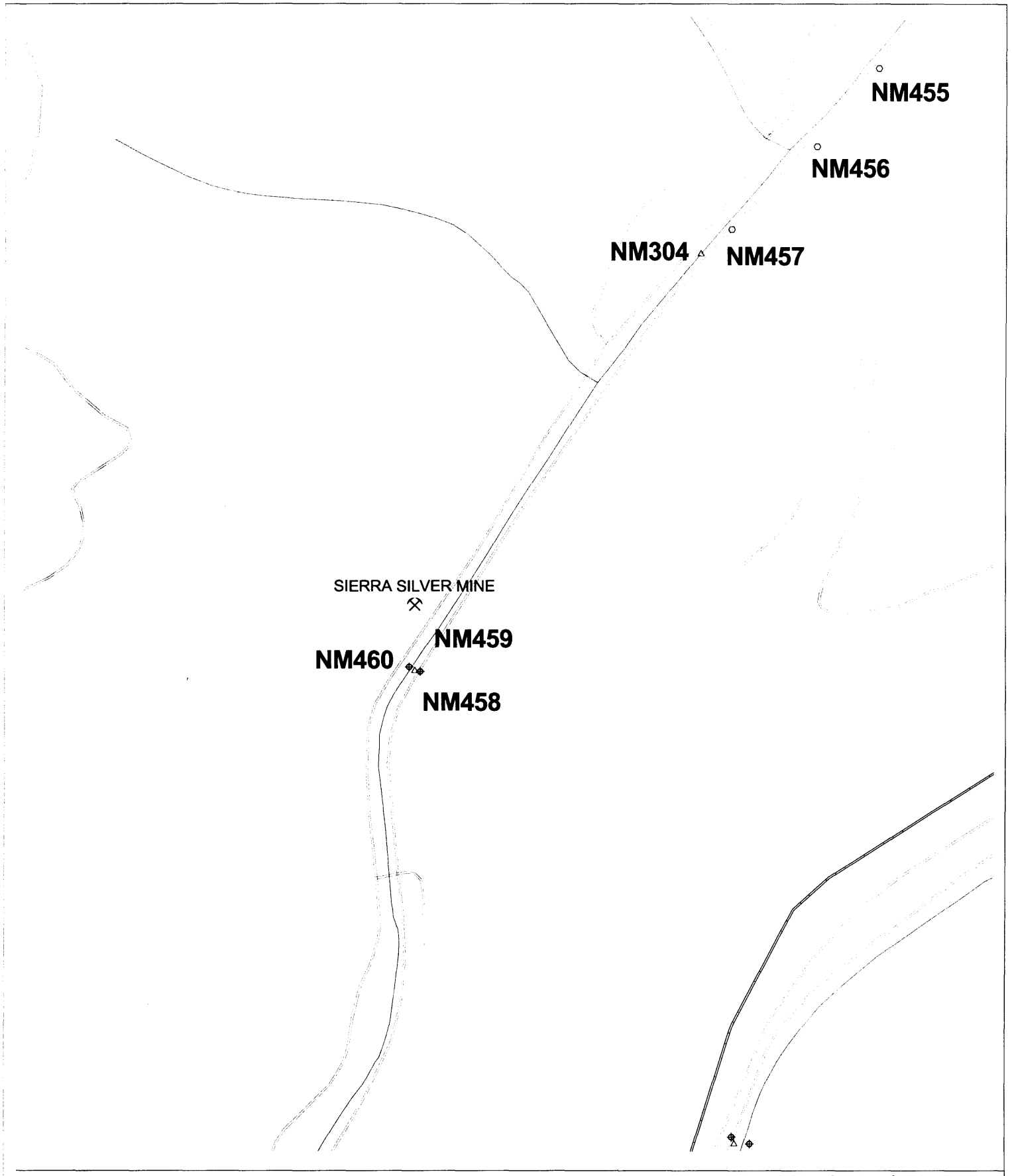


Figure A-13
Central Lower Ninemile Creek Valley
Ninemile Creek Drainage Basin

n:\projects\fsp08_draft_fsp
Layout:figa-13



N

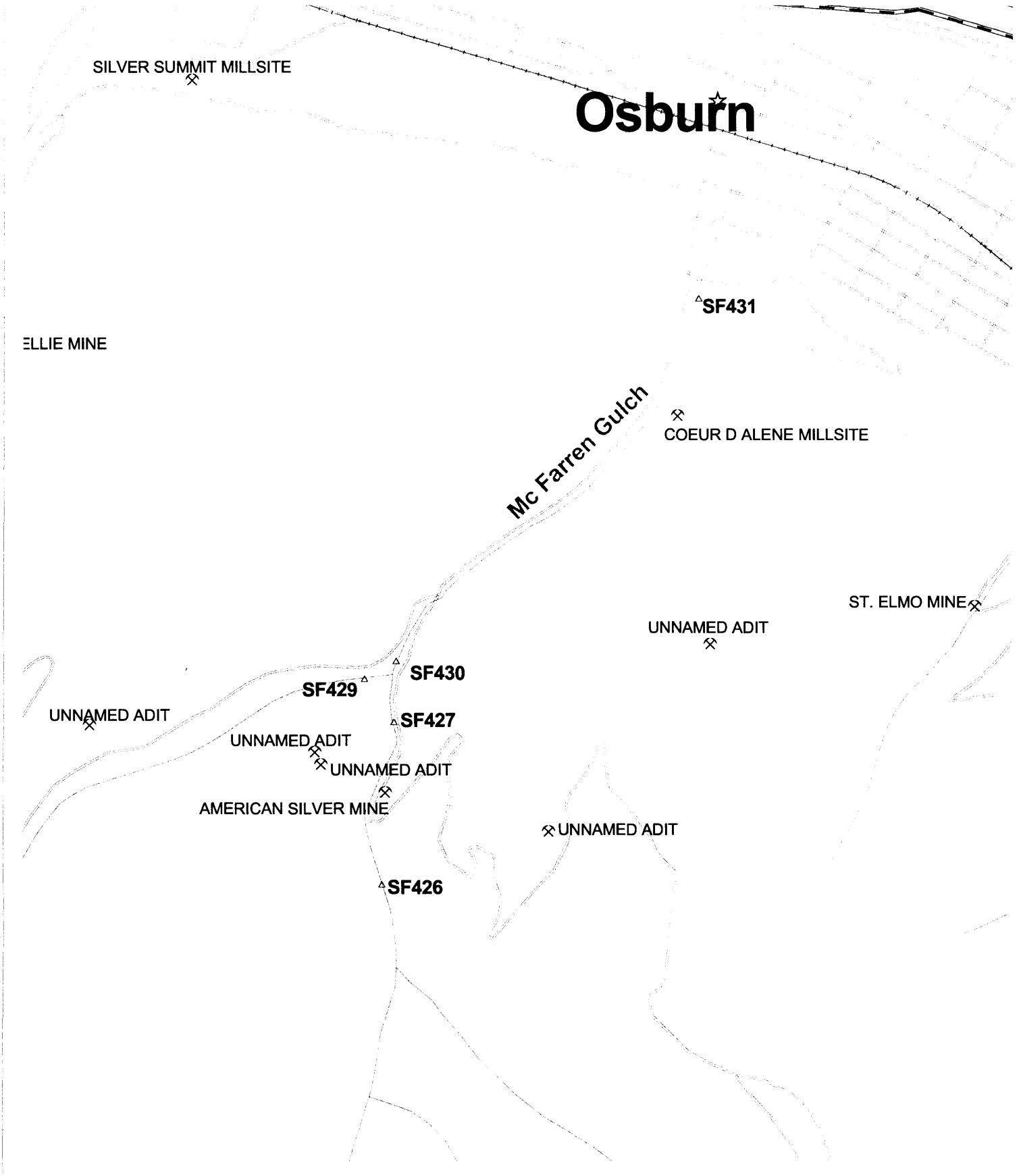
0 1000 Feet

n:\projects\fsp08_draft_fsp
view FSP08-1
Layout:figa14

Figure A-14
Mouth of Ninemile Creek
(within Lower NMC Valley)
Ninemile Creek Drainage Basin

Legend

- Ground Surface Sample (Soil/Sediment)
- River Sample Location (Water)
- Piezometer
- Monitoring Well
- Stream Guage Location
- Cities
- Streams
- Interstate 90
- Roads
- River Segment Zones



N

0 1000 Feet

Figure A-15
McFarren Gulch
South Fork CDR Drainage Basin

Legend

- Ground Surface Sample (Soil/Sediment)
- River Sample Location (Water)
- Piezometer
- Monitoring Well
- Stream Guage Location
- Cities
- Streams
- Interstate 90
- Roads
- River Segment Zones

n:\projects\fsp08_draft_fsp
view FSP08-1
Layout:figa-15

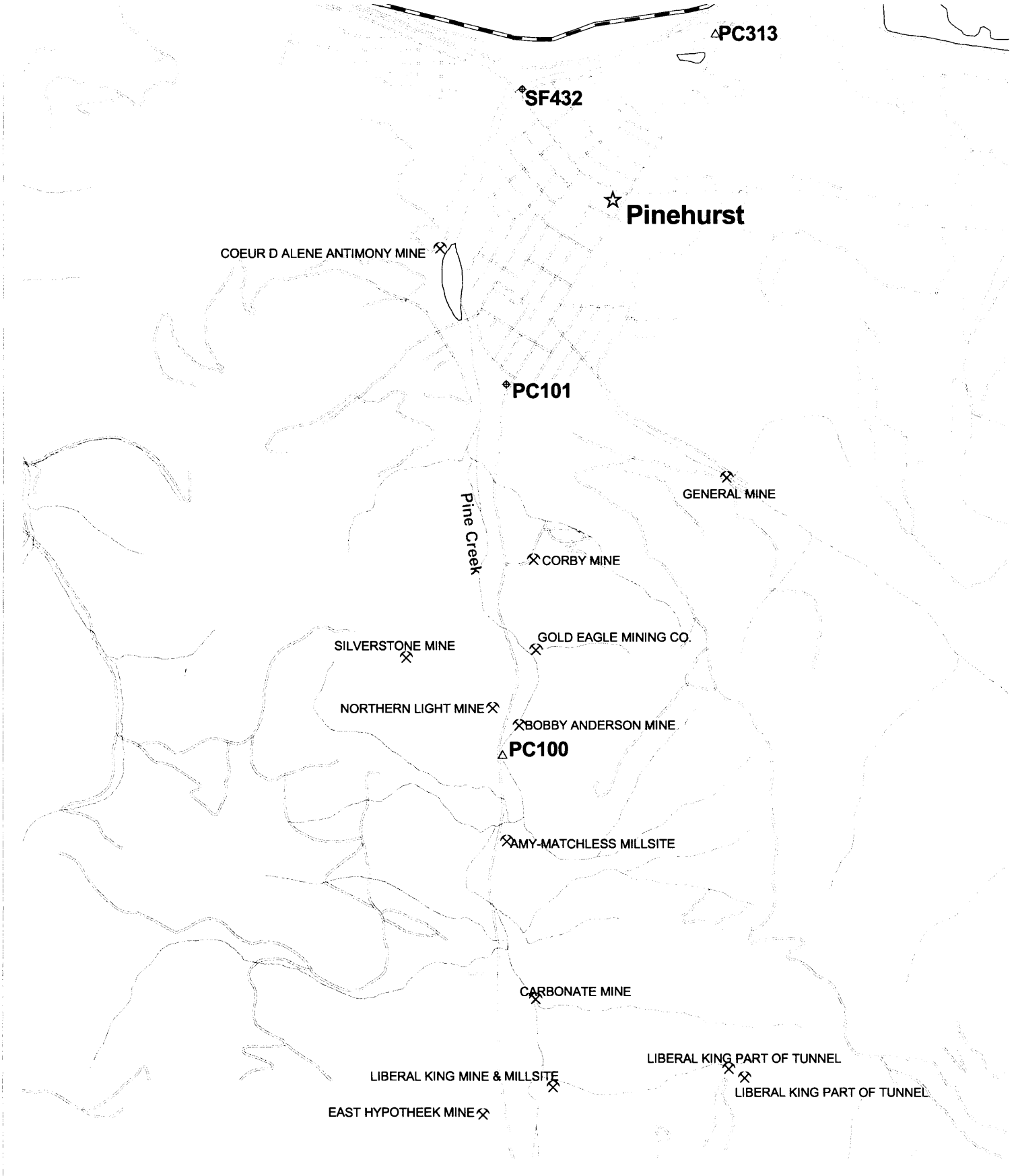


Figure A-16
Lower Pine Creek
Pine Creek Drainage

n:\projects\fsp08_draft_fsp
view FSP08-1
Layout:figa16

APPENDIX B

TECHNICAL MEMORANDA

Appendix B - Technical Memoranda

Tech Memo	Description
1	Additional Drilling and Soil Sampling Specifications for FSP #8, dated 10/28/98
2	Additional Soil Sample Archiving for FSP #8, dated 10/28/98
3	Work Scope Change for FSP #8 - Success Mine Dump, dated 11/03/98
4	Handling of Samples to be Archived and Clarification of Location Types, dated 11/06/98
5	Stream Gauging Locations on Canyon Creek, FSP #8, dated 11/11/98
6	Stream Gaging Locations on Ninemile Creek, FSP #8, dated 11/13/98
7	Geomorphic Evaluation of Canyon and Ninemile Creeks - FSP #8, dated 11/16/98
8	Groundwater Sampling Protocol for FSP #8, dated 12/01/98

URS Greiner Woodward Clyde

Technical Memorandum

To: URS Greiner Field Staff

From: Steve Hughes

CC: **EPA, CH2M Hill**

Date: 10/28/98

Re: Additional Drilling and Soil Sampling Specifications for FSP #8

The purpose of this memorandum is to add additional specifications regarding the execution of the FSP #8 field work and address comments received from the EPA on the workplan. Issues discussed in this technical memorandum are:

- Guidance for the drilling and logging of soil borings.
- Sample collection rational for acid/base accounting, mineralogical evaluation and geotechnical testing.
- Standard well construction.
- Guidance for piezometer construction.
- Well development specifications per EPA, April 1992, groundwater forum paper (from L. Edmond, EPA).
- Guidance on observations during testpit excavation.
- Clarification on pH/Eh field measurements for water samples and pH measurements on soil.
- Clarification of the location and matrix types that will be used identify samples collected

Drilling

The general scope of the drilling investigations is provided in Section 3.2.1 of the FSP. Standard drilling procedures are presented in Section 4.1 of the FSP. The purpose of this section is to provide additional guidance that will help field personnel collect relevant information during drilling.

Field personnel should assume that wide variations in subsurface materials and difficult drilling conditions will be encountered. These variations which may include, at a minimum, stratification or layering of material, rock types, rock size, soil moisture, perched zones of water, sulfide content, color etc, are an important part of the investigation. Observations regarding the nature and extent of the variations can provide insight into the potential occurrence, leaching and transport of metals through

the hydrologic system. These observations are valuable in interpretation of the analytical data which will be obtained from sample analyses.

Therefore, during this sampling effort, it is imperative that field geologists make their observations and prepare field notes and logs with sufficient detail to describe the variations encountered. As general guidance, the following paragraphs describe the types of observations and sampling decisions that should be made during drilling. However, it is the responsibility of the field geologists to record any other observations that could help in characterization of surface/subsurface conditions. Some decisions such as well construction problems or additional sample collection will require communication with the Task Manager. Details on communicating relevant and timely information during the field work will be discussed at the drilling kick off meeting in the Kellog Field Office. The following guidance is provided as a baseline for drilling observations.

- Note the thickness of fine material in the upper 5 feet of the borehole. Observe the fine material for possible chemical precipitates such as salts. At drilling locations where sufficient fines have accumulated close to the surface, infiltration of water may be impeded resulting in ponding or increased overland flow (possible surface erosion). This is especially true when drilling on a mine dump. Where possible, observe nearby surface conditions for potential signs of ponding water or surface runoff/erosion.

- Attempt to differentiate between mine waste types. To the extent possible, note different materials as the drilling proceeds through waste piles or fill. These materials may include: jig tailings, flotation tailings, waste rock. Examples of the various materials are readily available in the field and should be reviewed by the drilling team to help in identification of drill cuttings (prior to the start of field work).

- In some areas, the fill material consists of large rock debris, intermixed with smaller fill. If possible, note whether there are large voids that may act to preferentially channel subsurface movement of water. (This may be noted either by observations or the behavior of the drilling apparatus.)

- Classify colors using the method described in Section 4.1.2 (Munsell color chart). Pay special attention to color characteristics that may be used to identify potentially oxidizing or reducing conditions.

- Regolith to fill and regolith to bedrock contacts are very important. When possible, include observations and estimates of soil development (including organic content and thickness) and the overall thickness of the regolith. Observations of soil moisture and water movement at the bedrock contact should be included.

- Note all indications of perched water zones (i.e., saturated or wet soil zones) and potential surface discharge points.

Samples will be collected for acid/base accounting, mineralogical evaluation, and geotechnical testing. The geotechnical samples collected will initially be archived in the Kellogg Field Office. Sample collection should follow the following rational.

- Acid/base accounting will be used to help establish which sources investigated have a low or high potential to produce an acid condition. This information will be compared to seep, surface water and groundwater sampling. The data may provide insight and a firmer basis regarding metal mobility or potential buffering capacity. Acid/base accounting samples will be collected on the following basis:

    - At waste piles and similar mine waste sites: a maximum of three samples should be collected from within the pile, including one sample at the fill/regolith contact, if possible. The upper two

samples should be collected near the surface and midpoint of the boring. However, when conditions are highly variable, the field geologist should evaluate which sampling depths reflect the majority of the various materials observed. The samples should then be collected on that basis and detailed field notes prepared to fully support the field decision.

- At valley fill/road embankment locations, one sample should be collected within the fill and above the water table. The sampling interval should be selected to reflect what appears to represent the bulk of the material encountered.

- During the drilling program, field information will be reviewed with the Task Manager and if necessary, acid /base sample procedures modified based on actual subsurface conditions encountered. In cases where subsurface materials appear sufficiently uniform in character, samples may be composited. A maximum of 150 samples are anticipated for acid/base analysis.

- Mineralogical analysis will be selective and performed on samples retrieved from the laboratory after acid/base accounting analysis. This analysis will include a comparison to XRF data generated as part of FSP#9.

- Geotechnical sample collection is currently limited to proposed monitoring well location 444 on Ninemile Creek. This location is placed at the head of the Rex 2/sixteen-to-one tailings slope. Geotechnical soils samples will be collected in 3-inch diameter Shelby tubes (3 feet long) at a minimum of 5 foot intervals. The Shelby tubes will be pressed, not driven. If the driller experiences refusal before sufficient recovery is achieved, the borehole should be drilled out and a new Shelby sample should be attempted. The geotechnical samples will be archived in the Kellogg Field Office. While drilling MW444, the following information should be collected (in addition to the information specified previously):

  Relative density/consistency
  Material type (e.g., sand, silt, etc)
  Minor components using the following modifiers: trace (0-5%), little (5-20%), some (20-30%)
  Grading (well to poorly graded)
  Angularity
  Plasticity
  Moisture content

  The information that is listed above should be presented in the order given. Additional definition of these descriptive components can be found in Section 4.1.2 of FSP #8, and should be reviewed thoroughly.

Monitoring Wells

This section provides specific well construction details to be followed for FSP #8. The general scope of the monitoring well installations is provided in FSP #8 Section 3.2.2. General details regarding well installation is provided in FSP #8 Section 4.2. Additional details are also provided in the *Technical Specifications for Drilling, Subsurface Sampling, and Monitoring Well Installation* memorandum.

Monitoring wells will be constructed at all boring locations. These wells will be constructed of 2-inch diameter PVC slotted screen unless subsurface conditions warrant use of 4-inch casing. It is assumed that the groundwater will be unconfined at all drilling locations. The base of the monitoring well screen will be placed at the bedrock interface, if practical. A 2-footsand trap should be installed. The screened

interval will be extended to within 5 feet of ground surface. Sand pack will be placed from the bottom of the well casing to at least 2 feet above the screened interval. (Well screen will consist of 0.020 screen in coarse material [sand and larger], and 0.010 screen in fine material. Sand pack will be 10/20 or 20/40, according to the screen size [0.020 or 0.010, respectively]). A 2-foot minimum bentonite seal will be placed above the top of the sand pack. The remaining annular space (to ground surface) will be filled with pre-mixed concrete. Each well will be finished with a 12 inch diameter (or larger) flush mount protective casing. The surface around the casing will be finished with a convex finish to deter ponding.

In many cases, an above grade protective well cover will be installed instead of the flush mount. Height of the finished protective casing can vary depending on location. Therefore, field personnel must use their best judgment to establish a well head that is protected, can be resampled (during winter snow cover) and does not create a potential problem or hazard in residential areas or roadways.

Piezometers

A maximum of 15 piezometers will be installed on an as-needed basis throughout the area covered in FSP #8. These piezometers will only be used for water level measurement and will not be developed or sampled. The well construction will consist of a borehole extending about 5 feet below the observed water table and a screened interval to within 5 feet of ground surface. The piezometer will be constructed of 2 inch 0.020 slotted PVC with filter pre-pack. The borehole will be backfilled with the drill cuttings. A 2 foot bentonite seal will be placed from 3 to 1 foot below ground surface and the final foot will be backfilled and compacted to grade with drill cuttings. Piezometers will not be installed with flush or above-ground protective casings.

Monitoring Well Development and Sampling

Monitoring well development was described in Section 4.2.2 of FSP #8. EPA has suggested we use a memo provided by them (EPA 1992). This memo is attached and provides a step-by-step well development procedure. Please review this memo. We will use this procedure as a starting point and if needed, modify it to achieve well development.

Sampling of the monitoring wells will occur during the later portion of the field effort. Actual sampling protocol will be described in separate FSP08 Technical Memorandum which focuses on stream sampling, flow gauging and groundwater sampling. The purging and sampling protocol(s) may need to vary based on differing materials encountered (permeability's) throughout the area investigated. The memorandum will also discuss use of downhole flow meters for measurement of vertical and horizontal flow components.

Test Pits

Test pits are proposed along the top of the Success waste pile. The purpose of these pits is to evaluate the pile/regolith/bedrock contact and the geomorphology of the hillside slope for design purposes. They will also be used to measure the depth to bedrock, if feasible. These locations are intended for descriptive purposes only and will not be used for sample collection or groundwater monitoring. Information that should be noted for these locations include:

Soil profile
Grain size

Color
Water content
Evidence of oxidation or reduction of the soil
Density
Contacts between fill/regolith and regolith/bedrock
Nature of these contacts (rock weathering, oxidation, etc.)
Nature of the fill (jig tailings, flotation tailings, waste rock, etc)
Layering or stratification
Perched water zones
Grading
Plasticity

A sample test pit log is attached to this memorandum. The test pit logs should include the information listed above as well as the information that is described for boring logs in Section 4.1.2 of FSP #8.

pH/Eh Measurements

Clarification: Both pH and Eh measurements will be collected in the field while collecting groundwater and surface water samples. One set of field parameter measurements (pH, Eh, temperature , turbidity) will be collected at each water sampling location during sample collection.

Each soil sample that is submitted to the laboratory for analysis will also have a pH measurement performed (in the *laboratory*). No field measurements will be made on soil samples during execution of FSP #8.

Location and Matrix Types

All location and matrix types are designated in the tables in the FSP #8 appendix. These codes are designated on a location specific basis and should not be modified without authorization of the Project Manager and consensus of TDM. Please notify the Project Manager with any questions or concerns regarding the location and matrix types.

Additional notes:

- At all boring/monitoring well locations, the tables in FSP #8 lists only the first few soil depth intervals. At these locations, additional depth intervals would have the same Location ID, Location Type, and Matrix Type, but would have different depth intervals on the location and sample collection forms.

- All soil samples will be given the matrix type "SB". Any differentiation between 'surface soil', 'near surface soil', subsurface soil', etc. will be designated within TDM at the Project Manager's request.

All monitoring wells will be surveyed to establish horizontal and vertical control using GPS. In cases where GPS calibration is limited, field survey crews will complete control surveying.

Statistical Sampling

Soil sample collection to assess remedial efforts will be based on the assumption that the material sampled is statistically homogenous. In an area that has been remediated, the visible extent of the area will be estimated and then measured. The area will then be subdivided into 5 approximately equal sections. A grid will be constructed in each section using the same method to establish all grid origins. A random number will be generated to identify one sample location in each of the grid sections. This method should result in the highest sample concentration overestimating the mean of the sampled area.

URS Greiner Woodward Clyde

Technical Memorandum

To: URS Greiner Field Staff

From: Steve Hughes

CC: Rebecca Juul

Date: 10/28/98

Re: Additional Soil Sample Archiving for FSP #8

As a follow up to our telephone conversation today I am requesting that additional soil/rock samples be collected. Currently, split spoon samples are being collected at 5-foot drilling intervals. For every split spoon that is not being submitted for laboratory analysis, (per protocol described in FSP8 and the Technical Memorandum) the following procedure should be used to collect and archive additional soil/rock samples for later examination.

1) If the split spoon sample recovery exceeds 50%, then place the entire sample in a plastic freezer bag and record the location ID and depth interval on the bag.

2) If the split spoon sample recovery is less than 50%, then place the split spoon sample in a freezer bag and record the location ID and sample interval. In addition, collect drill cuttings from the first foot of drilling advanced below the split spoon sample interval. The drill cuttings should also be placed in the freezer bag containing the split spoon sample and the drill cutting interval noted on the bag.

3) All samples collected in this manner should be properly recorded in the field log book. Samples should be placed in a box that lists the contents (Location Ids) and the box sealed with chain-of custody tape. The box should be placed in locked storage at the Kellogg field office.

The above sample collection is in addition to the current sampling protocol. And should not alter the current sample collection for laboratory analysis. If there is any question about this procedure please call me.

URS Greiner

Memorandum

To: URS Greiner Field Staff

From: Steve Hughes

CC: Anne Dailey - EPA, Dan Winstanley - CH2M Hill, Rebecca Juul – URS Greiner

Date: 11/3/98

Re: Work Scope Change for FSP #8 – Success Mine Dump

Based on our teleconference this afternoon, I am requesting that we change the planned investigation of the Success Mine Dump as follows:

1. We should start test pit excavation at locations 424 and 427 as shown on the attached figure. This should give us some idea of difficulties with excavation to bedrock. It will also minimize the potential for excavating the drain pipe that is present northeast of the Success No. 3 adit. At both of these locations temporary piezometers (see previous tech memo) should be installed to bedrock.

2. After excavation of the first two test pits we will review other planned locations and decide upon the best way to proceed. If there is reasonable assurance that we can excavate test pits at locations 425 and 426 without damaging the drain pipe we will proceed. Otherwise we will discuss changing the test pit locations.

3. As previously discussed, the driller cannot mobilize his equipment to the top of the mine dump. Therefore, we will not drill and install a monitoring well at location 428. Instead, we will excavate a test pit to the maximum depth possible. If water is encountered we may want to install a piezometer. As guidance, we would like to evaluate how water is collecting and/or moving along the dump/regolith/bedrock contact. As previously discussed, this excavation should only be implemented if we are reasonably sure that the excavation will not damage the drain pipe or nearby catchment basin.

4. During excavation, all observations described in FSP08 and the previous drilling tech memo should be noted in your log book. In addition, we should collect samples from the test pits and archive them under a chain-of-custody. The samples should be stored in a secure room at the Kellogg field office. Sample collection should include mine dump material, soil profile, regolith and bedrock. In addition, collect and archive any other sample you believe would help interpret subsurface conditions. These samples can be stored in a plastic freezer bags.

   Please use your judgement to evaluate subsurface conditions encountered in the test pits. If unusual coloration, or substantial water movement is indicated, collect one or two samples from a test pit for possible laboratory analysis. These samples should be collected in the appropriate glassware (based on what analysis you would suggest) We should review by telephone your findings and discuss potential analysis prior to submittal of such samples.

If you have any questions regarding this memo please call me to discuss.

Attachment

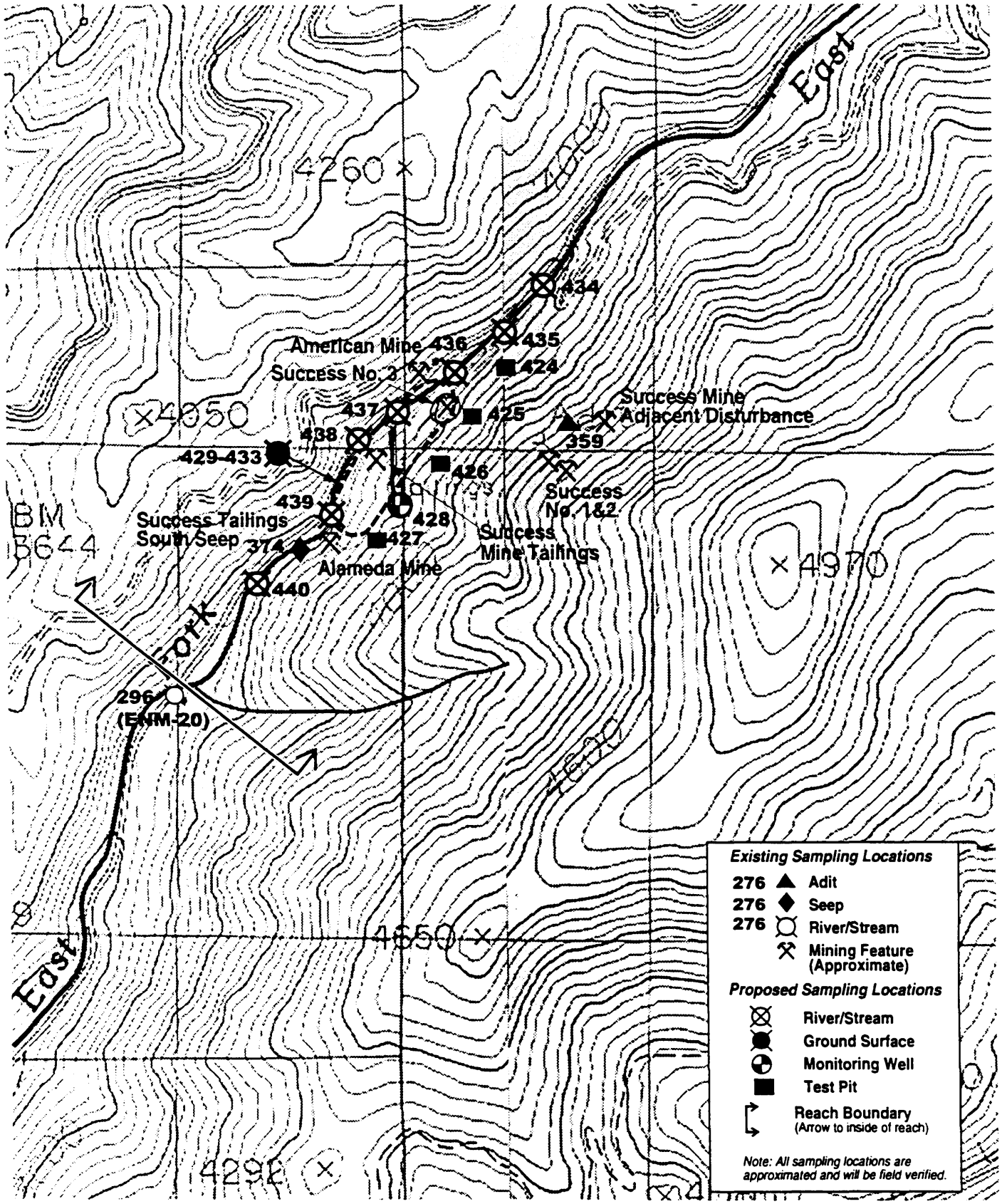


Figure A-11
Success Reach
Ninemile Creek Drainage Basin

Memorandum

To: Steve Hughes

CC: Rebecca Juul

From: Jill Johnston

Date: 11/06/98

Re: Bunker Hill, FSP8

Two issues have been brought to my attention by the field crew, a need for clarification of location types and a need for clarification in the handling of archived samples. I propose the following solutions:

HANDLING OF SAMPLES TO BE ARCHIVED

The samples to be archived should be handled in the same manner as all other samples.

- Assign field sample numbers
- Maintain usual records of sample collection on separate sample collection forms (location id, depth intervals, sampling time, etc) and mark these forms as archived samples.
- Fill out COC's and custody seal
- Maintain all samples to be archived in a locked facility

These samples may need to be used in the future and we need the same quality of documentation for them as would be required for any other sample.

CLARIFICATION OF LOCATION TYPES

Location coding for test pits in which piezometers are installed:

- Maintain location id (3-digit number) for test pit
- Use location type PZ
- Use "piezometer installed in test pit" phrase in location description
- All piezometers installed in new locations should use location id's in the range 1000-1099

We would like to be able to preserve the fact that these are both test pit and piezometer locations without adding too much confusion. It is important to use the above phrase as written to preserve this information.

Technical Memorandum

URS Greiner Woodward-Clyde

To: URS Greiner Field Staff

From: Steve Hughes

Date: 11/11/98

Re: Stream Gaging Locations on Canyon Creek - FSP #8

Perform stream gaging and sampling of the following 28 locations on Canyon Creek (copies of the map are attached):

- 288
- 482
- 457
- 286
- 17
- 455
- 454
- 484
- 282
- 444
- 443
- 486
- 485
- 442
- 439
- 436
- 438
- 425
- 280
- 279
- 421
- 420
- 277
- 276
- 411
- 410
- 392
- 275

Resampling and gaging of several surface water locations will be performed during the groundwater sampling event.

Technical Memorandum

URS Greiner Woodward-Clyde

To: URS Greiner Field Staff

From: Steve Hughes

Date: 11/13/98

Re: Stream Gaging Locations on Ninemile Creek - FSP #8

Perform stream gaging and sampling of the following 26 locations on Ninemile Creek (copies of the map are attached):

- 305
- 460
- 304
- 303
- 302
- 301
- 452
- 450
- 448
- 443
- 8
- 297
- 296
- 440
- 439
- 438
- 437
- 436
- 435
- 295
- 412
- 411
- 294
- 293
- 292
- 291

Resampling and gaging of several surface water locations will be performed during the groundwater sampling event.

Technical Memorandum

URS Greiner Woodward-Clyde

To: URS Greiner Field Staff

From: Steve Hughes

Date: 11/16/98

Re: Geomorphic Evaluation of Canyon and Ninemile Creeks - FSP #8

Document geomorphic observations in the vicinity of selected monitoring well/stream gaging locations on both Canyon and Ninemile Creeks. Attached are supplemental materials provided for review and use, if appropriate. Please note the following details:

- Erosional versus depositional characteristics
- Average and maximum sediment size
- Bedrock outcrops nearby and in the stream channel, including lithology, strike and dip, and structural features
- Evidence of losing versus gaining streams
- Input sources to streams, including adits, waste pile seepage, springs; and relationship of input sources to surface water sampling locations
- Estimated stream gradient
- Characteristics of water and alluvium, including color, staining, clarity, algal growth
- Chanel morphology (channelized, rip-rap, pool/riffle, braided, meandering)
- Areas of recent and active stream reclamation
- Estimates of regolith thickness along valley walls
- Depositional features such as gravel bars and evidence of actively moving alluvium
- Channel width, depth, and bearing
- At sites near surface water sampling locations, record pH, conductivity, and velocity
- Locations and types of nearby mine features including adits, mill, tailings, waste rock, shafts, and buildings
- Prepare a site map and take photographs at each location

Locations where evaluation is to be performed:

- Canyon Creek at the confluence of Gorge Gulch
- Canyon Creek near the Burke Mine and Millsite
- Canyon Creek at monitoring wells 417 and 418
- Canyon Creek near the Tamarack No. 7 Mine
- Canyon Creek near the Frisco/Black Bear Mine and Millsite
- Canyon Creek at the Hecla/Star Tailings Ponds
- Lower Canyon Creek pinch point
- East Fork Ninemile Creek at Wilson Creek/Interstate Callahan Mine and Millsite
- East Fork Ninemile Creek at the Success Mine and Millsite
- Confluence of West and East Forks of Ninemile Creek
- Lower Constriction of Ninemile Creek

URS Greiner

Technical Memorandum

DRAFT

To: URS Greiner Field Staff

From: Steve Hughes

CC: **Anne Dailey - EPA, Lorraine Edmonds - EPA, Dan Winstanley, CH2M Hill, Chuck Vita - URSG, Rebecca Juul - URSG**

Date: 12/1/98

Re: Groundwater Sampling Protocol for FSP #8

The purpose of this technical memorandum is to provide additional detail regarding the execution of the FSP08 field work and address comments received from the EPA on the draft FSP08 Workplan. The following sections discuss the protocol for collection of groundwater samples. Sampling depths are identified in the attached Table 1.

Groundwater Sampling Rationale

The rationale for placement of each boring/well was presented in the Appendix of Field Sampling Plan 08 (FSP08). Internal initial review of the preliminary data gathered during drilling and subsequent well development have been used to further refine proposed sampling protocol. The overall objectives for the first sampling event will be to investigate the potential dissolved inorganic loadings in the water table aquifer and the potential for vertical and horizontal variations near suspected sources and at possible bedrock constrictions.

Specifically, during late fall, Nine Mile Creek and Canyon Creek should be near low flow. This condition corresponds to the seasonal low water table. Under these conditions, the surface water and groundwater sampling conducted as part of FSP08 will be used to help evaluate the following:

1) Inorganic loading in surface water and groundwater at or near low flow conditions and the potential effects of stream channel geometry on flow (losing and gaining) and inorganic concentrations along the channel system relative to sources of loading.

2) Volume of unconsolidated material present in the canyons which is saturated at low flow and identification of potential sources of loading located within the material.

3) Potential vertical stratification of the water column and chemical conditions that may influence transport of dissolved load through lower portions of the water table aquifer.

4) Identification of potential near-surface loading from the Hecla-Star Tailings Ponds.

5) Surface water interaction with upland and flood plain sources (Rex Mine, Tamarack #7 and Success Mine) and potential dump-regolith-bedrock effects relative to inorganic mobilization and transport into the stream/groundwater system.

To accomplish the objectives, groundwater sample collection will focus on the following three depth intervals: 1) two feet below the water table surface, 2) at approximately 8-feet below the water table surface and 3) two feet above the bottom of the screened interval. The sampling depths were selected to gather chemical data which may help better relate the following subsurface conditions: 1) surface water/groundwater interaction close to the stream bed, 2) groundwater conditions at an intermediate depth which may avoid some of the direct loading effect from surface discharges (adits and seeps) or possibly sediment transport/deposition but still sufficiently deep to evaluate embankment materials submerged under low flow conditions and 3) near the channel gravel/bedrock contact. The attached Table 1 lists well screen intervals and sampling depths for each well.

At each monitoring well location the combination of sampling depths was selected based on the potential sources and loading identified during the Tier 1 Site Reconnaissance. In Canyon Creek and Nine Mile Creek, shallow and intermediate sampling depths were selected for wells located up and downstream from several potential sources located in the Tamarack 7 (dump), Gem Mill Site (dump/Embankment) and Hecla-Star Tailings Ponds and Day Rock Mine (embankment) areas. Data gathered on potential stream and groundwater inorganic concentrations in these areas should help evaluate the total load being carried in the watersheds.

Groundwater purging and sampling will be done using low-stress, low-flow techniques. Well development has revealed that moderate turbidity and colloidal material may be encountered during sampling. To minimize turbidity, flow rates used during purging and sampling will be kept below 500 milliliters per minute (ml/min). The procedure described in this memorandum follows EPA procedures described in "Low-Flow (Minimal Drawdown) Ground Water Sampling Procedures," R.W. Puls and M.J. Barcelona, 1996. A peristaltic pump is the primary pump used to conduct the well purging and sampling. However, if the depth to water precludes use of a peristaltic pump, a submersible pump will be used. The use of the submersible pump should follow, as closely as practicable, purge and sampling procedures described for the peristaltic pump.

Monitoring Well Purging

All newly constructed wells will be allowed to stabilize for a minimum of 7 days following installation and prior to sampling. Field personnel will enter all applicable information on the Monitoring/Sampling Location Information form according to Section 5 of FSP08 using the appropriate data management codes established for the project.

The field coordinator will ascertain the well characteristics by reviewing the development log. The volume of water produced during development and the drawdown/recovery should be used as a guide in evaluating the expected well yield. Whenever possible, a peristaltic pump will be used to purge and sample wells. If the depth to water requires precludes use of a peristaltic pump, a submersible pump will be used to conduct purge and sampling of the wells.

The following procedure is for low-stress, low flow sampling using a peristaltic pump.

Prior to purging, measure and record the following groundwater parameters:

- Depth to water surface (measured)
- Static water level elevations (calculated)
- Depth to well bottom (measured)
- Height of water column (calculated)
- Volume of water, calculated as: $V(\text{gallons}) = 7.48(\pi r^2 h)$, where r = radius of well in feet, h = height of water column in feet

Following collection of initial groundwater information the well should then be purged in preparation for sampling by the following procedure:

- The estimated length of decontaminated dedicated sampling tube used should be sufficient so that following sample collection the sampling tube can be lowered to the bottom of the well screen to collect additional field measurements.

- To initiate the well purging the sampling tube should be inserted slowly into the well casing in a manner that causes minimal disturbance of the water column. The sampling tube should be lowered to the sampling depth as indicated in Table 1. Purge and sample collection should start with the deepest interval identified in Table 1 for a monitoring well.

- Pumping should be initialized at a very slow rate (200 ml/min.). During pumping, the static water level should be measured using the water level probe to check for measurable drawdown. The purge rate can be slowly increased to 500 ml/min. if drawdown remains at the well recharge rate and the increased flow does not increase turbidity. At no time will the final established flow rate exceed 500ml/min. The flow

rate and water level measurements will be carefully monitored to ensure that the pumping rate remains constant during purging.

- During well purging temperature, pH, Eh, specific conductance, turbidity, and dissolved oxygen should be measured at 5 min. intervals. Purging should be considered adequate when the field measurements vary less than 10% over three consecutive measurements. Samples for laboratory analysis will only be taken after field measurements indicate adequate purging or field measurements do not stabilize, a minimum of three well volumes have been purged.

Alternate Purge Procedures

- If the development record indicates that a well can be purged dry at a low flow rate then the above protocol should be followed with the lowest possible flow rate for the pump used for purging and sampling.

- If the depth to water precludes the use of a peristaltic pump, then a submersible pump may be used. The protocol described above should be followed as close as possible to collect a low turbidity, low flow sample. Given the size of a submersible pump, insertion and movement of the pump in a well should proceed slowly to minimize water movement and increases in potential turbidity.

- If, during purging, drawdown is unavoidable, sampling should not be performed until the water level in the well is above the top of the screened interval. If the original static water level was below the top of the well screen, sampling should not be performed until the water level has reached a minimum of 80 percent of the original static level.

Sample Collection

Procedures for collecting a filtered groundwater sample are as follows:

- Groundwater sampling will be performed at a specified sampling depth once the requirements for field parameter stabilization or minimum purge volumes have been met. Well sampling with the peristaltic pump will be performed at a flow rate not exceeding 300 ml/min. When using a submersible pump for sample collection, the flow rate should be set as low as possible without causing damage to the pump.

- Prior to containerizing the sample, the groundwater will be filtered using a 0.45-micron filter (disposable). The filtered groundwater will be introduced into the sample container (with preservative) immediately after filtering, or the water can be filtered directly into the sample container.

- If during the filtering process the filter becomes clogged or filtering is severely impeded by sediment particles in the filter, the filter will be replaced with an unused (new) filter. Field personnel will ensure that used filters are not used on samples collected later in the field investigation.

The above procedure should be repeated for each sampling depth indicated in Table 1.

Post-Sample-Collection Follow-up

Collect post-sampling field measurements as follows:

- At each sampling depth in Table 1 for which sample collection was not indicated field parameters will be measured. The sampling tube should be lowered to each of the non-sampled depth(s) as indicated in Table 1 and the purge procedure followed. Field measurements should include the temperature, specific conductance, pH, Eh and dissolved oxygen. The sample flow rate should not exceed 500 ml/min. Continue field measurements until three consecutive readings vary less than 10% or, if the parameters do not stabilize, a minimum of one well volume has been purged.
- Repeat the purge and measurement procedure at each non-sampled depth
- Record all information on the sample form and discard the samples.

All extracted water should be containerized so that it may be disposed of in the manner specified in the generic SAP (URSG 1997a). When sampling is completed, the well should be closed and locked. All equipment should be decontaminated according to the generic FSP (URSG 1997a).

Attachment: Table 1 Monitoring Well Sampling Depths

Table 1, Monitoring Well Sampling Depths

Site	Loc Id	Date Installed	Well TD (ft) Below TOC	Screened Interval		DTW (ft) Below TOC	Water Column	Purge Method	Purge Vol. (gal)	Bailed (gal)	Developed		Sampling Depths			Location Description
				Top (ft)	Bottom (ft)						(gal)	NTU	2 Feet Below SWL	8 Feet Below SWL	2 Feet Above Bottom of Screen	
CC	401	10/26/98	23.53	5	20	13.54	9.99	Perist	1.63	7	little wtr		F	Sample	F	Herc No. 5
CC	402	10/27/98	34.51	10	35	12.96	21.55	Perist	3.51	30	237	57	F	Sample	F	Herc No. 5
CC	403	10/27/98	25.41	7.5	22.5	11	14.41	Perist	2.35	30	200	Clear	F	Sample	F	Herc No. 5
CC	409	10/27/98	32.12	3.5	28.5	12.61	19.51	Perist	3.18	15	50	Clear	F	Sample	F	Burke
CC	414	10/27/98	24.15	5	20	7.2	16.95	Perist	2.76	5	24	4	F	Sample	F	Burke
CC	415	10/28/98	23.31	5	20	11.88	11.43	Perist	1.86	20	185	27	F	Sample	F	Burke
CC	417	10/28/98	19.42	5	20	3.36	16.06	Perist	2.62	32	110	0	F	Sample	Sample	pre-Burke
CC	418	10/28/98	42.38	3.5	38.5	13.2	29.18	Perist	4.76	25	80	0	F	Sample	Sample	pre-Burke
CC	419	10/28/98	39.82	10	40	9.27	30.55	Perist	4.98	25	40	39	Sample	Sample	F	pre-Burke
CC	422	10/29/98	20.35	5	20	8.1	12.25	Perist	2	25	144	2	Sample	Sample	F	pre-Burke
CC	423	10/26/98	15.04	5	10	7.83	7.21	Perist	1.18	20	131	5	Sample	F	F	Tam No. 7
CC	431	10/25/98	97.7	10	95	74.16	23.54	Grundfos	3.84	25	350	17	Sample	Sample	F	Tam No. 7
CC	432	10/26/98	33.25	10	30	32.51	0.74	Bailer	0.12	little wtr			Sample	F	F	Tam No. 7
CC	433	11/6/98	48.58	5	45	10.84	37.74	Perist	6.15	30	211	5	Sample	Sample	Sample	Tam No. 7
CC	434	11/6/98	28.4	5	25	9.63	18.77	Perist	3.06	25	218	2	F	Sample	F	Tam No. 7
CC	437	10/25/98	136.36	42	132	114.11	22.25	Grundfos	3.63	30	380	3	Sample	Sample	F	Tam No. 7
CC	440	10/26/98	31.06	7	27	11.04	20.02	Perist	3.26	35	323	62	F	Sample	F	Frisco
CC	441	11/6/98	30.22	4.9	29.9	8.57	21.65	Perist	3.53	45	223	64	Sample	Sample	Sample	Gem
CC	449	11/7/98	38.25	9	34.5	11.73	26.52	Perist	4.32	25	192	3	Sample	F	F	Gem
CC	451	10/30/98	38.8	4	39	10.23	28.57	Perist	4.66	25	164	26	Sample	Sample	Sample	Gem
CC	452	10/29/98	44.96	10	45	5.68	39.28	Perist	6.4	35	298	19	F	Sample	F	Gem
CC	453	11/5/98	34.78	5.9	30.9	10.18	24.6	Perist	4.01	27	111	2	Sample	Sample	Sample	Gem
CC	456	11/5/98	29.8	4.8	29.8	6.12	23.68	Perist	3.86	25	71	2	Sample	Sample	Sample	Woodland Park
CC	459	11/12/98	47.7	5	45	20.16	27.54	Perist	4.49	20	123	20	Sample	Sample	Sample	Hecla Tailings Pond
CC	460	11/18/98	49.57	5	50	10.72	38.85	Perist	6.33		143	3	Sample	Sample	Sample	Hecla Tailings Pond
CC	462	11/13/98	33.17	5	30	5	28.17	Perist	4.59	25	123	30	Sample	Sample	F	Hecla Tailings Pond
CC	463	11/9/98	63.3	10	65	11.08	52.22	Perist	8.51	40	112	29	Sample	Sample	Sample	Hecla Tailings Pond
CC	464	11/12/98	64.06	10	60	17.01	47.05	Perist	7.67	22	95	32	Sample	Sample	Sample	Hecla Tailings Pond
CC	465	11/11/98	53.66	5	50	6.64	47.02	Perist	7.66	146	140	12	Sample	Sample	Sample	Hecla Tailings Pond
CC	467	11/10/98	45	5	45	7.52	37.48	Perist	6.11	35	100	28	Sample	Sample	Sample	Woodland Park
CC	468	11/9/98	40	5	40	4.94	35.06	Perist	5.71	25	130	37	Sample	Sample	F	Woodland Park
CC	469	11/9/98	43.7	4.9	39.9	6.34	37.36	Perist	6.09	25	84	38	Sample	Sample	F	Woodland Park
CC	480	11/4/98	13.62	3.7	13.7	9.58	4.04	TBD	0.66	1	1	dry	Sample	F	F	I-90
CC	481	11/17/98	23.39	5	20	9.97	13.42	Perist	2.19		212	77	Sample	Sample	F	I-90
CC	1000	10/26/98	33.06	5	30	12.04	21.02	Perist	3.43	piezometer			F	F	F	Tam No. 7
												Canyon Creek Sample Totals:	**23**	**30**	**13**	

Table 1, Monitoring Well Sampling Depths

Site	Loc Id	Date Installed	Well TD (ft) Below TOC	Screened Interval		DTW (ft) Below TOC	Water Column	Purge Method	Purge Vol. (gal)	Bailed (gal)	Developed		Sampling Depths			Location Description
				Top (ft)	Bottom (ft)						(gal)	NTU	2 Feet Below SWL	8 Feet Below SWL	2 Feet Above Bottom of Screen	
NM	421	10/23/98	23.75	5	20	dry		TBD		dry			Sample	F	F	Rex
NM	422	10/23/98	22.6	5	20	14.73	7.87	Perist	1.28	5	2.5		Sample	F	F	Rex
NM	423	10/23/98	19.68	5	20	dry		TBD		dry			Sample	F	F	Rex
NM	424	11/5/98	3	0	3	unk	unk	Perist	unk	piezometer			F	F	F	Success
NM	425	11/4/98	4	0	4	unk	unk	Perist	unk	piezometer			F	F	F	Success
NM	426	11/5/98	14.1	0	14.1	unk	unk	Perist	unk	piezometer			F	F	F	Success
NM	427	11/4/98	9.1	0	9.1	unk	unk	Perist	unk	piezometer			F	F	F	Success
NM	428	11/5/98	15	0	15	unk	unk	Perist	unk	piezometer			F	F	F	Success
NM	441	11/5/98	45	10	45	10.39	34.61	Perist	5.64	25	97.2	39	Sample	Sample	Sample	Zanettiville
NM	442	11/4/98	36.85	5	35	9.6	27.25	Perist	4.44	30	344	124	Sample	Sample	Sample	Zanettiville
NM	444	10/23/98	79.75	12	77	74.84	4.91	Grundfos	0.8	7.5			Sample	F	F	Rex
NM	458	11/4/98	32.97	5	34	5.32	27.65	Perist	4.51	134	220	4	Sample	Sample	Sample	Sierra Silver
NM	459	11/12/98	29.43	5	30	5.66	23.77	Perist	3.87		449	154	Sample	Sample	F	Sierra Silver
NM	1001	10/26/98	15.27			dry		TBD		piezometer			F	F	F	Rex
PC	101			residential well, location to be determined									Tap Water			Pinehurst
SF	432	11/15/98	59.45	10	60	16.75	42.7	Perist	6.96	20	865	80	Sample	Sample	Sample	Pinehurst
												Nine Mile Creek Sample Totals:	**9**	**5**	**4**	
												Total Number of Samples Collected:	**32**	**35**	**17**	**84**

Pump Methods:

Grundfos dtw > 30 ft

Peristaltic dtw < 30 ft

Bailer - when necessary

Sample = Collect Groundwater Sample

F = Collect Only Field Parameters

Erratum for
Field Sampling Plan Alterations for
FSPA No. 8

ERRATUM FOR FSPA NO. 8 ALTERATION REPORT

Several deviations were identified to the *Field Sampling Plan Alterations, Bunker Hill Basin-Wide RI/FS, Shoshone County, Addendum 08* dated July 21, 1999.

The number of subsurface samples cited in Section 3.1 is incorrect. A total of 82 samples were collected as part of Task 1. In section 3.1, the first deviation states "Only three of the subsurface soil samples collected from each boring or excavation were submitted for analysis (refer to Tech Memo dated 10/28/98)." Actually, three samples were obtained at only 6 monitoring well locations. Fewer samples were obtained at the other locations as explained in the third noted deviation. Therefore, the statement should read "Up to three of the subsurface . . .".

The following deviations were not included in Section 3.1:

1. Exploratory borings/monitoring wells CC459, CC460, and CC462 were relocated from the top of the Hecla-Star Tailings Ponds to new locations adjacent to the tailings ponds due to concern over drilling through the bottom of the tailings ponds.

2. Exploratory borings/monitoring wells CC458, CC461, and CC466 were not drilled. Since exploratory borings/monitoring wells were not installed on the Hecla-Star Tailings Ponds, adequate coverage of the surrounding area was obtained using fewer borings/wells.

3. No soil samples were collected during the drilling of exploratory boring/monitoring well CC401.

4. One soil sample was collected from CC423, but it was not submitted to the analytical laboratory.

5. Two soil samples were obtained during the drilling of the monitoring well PC432. No soil samples were planned for this location according to the field sampling plan.

6. Mineralogical analysis was not performed on any samples.

The following deviations were not included in Section 3.2:

1. Monitoring wells CC480, NM421, and NM423 were not sampled because they were dry.

2. One groundwater sample was obtained from monitoring wells NM441, NM442, and NM459 approximately a week after the initial sampling.

3. Fewer samples were obtained from monitoring wells CC437 and CC441 than planned.

4. Two additional samples were obtained from monitoring well CC449.

The following deviations were not included in Section 3.3:

1. A surface soil sample was not collected at this location (CC448) at the Gem Millsite.

2. A sample of the precipitate under the Gem outfall (CC450) was not sampled because Asarco samples this outfall on a regular basis.

The number of surface water locations sampled along Nine Mile Creek is 27, not 26, as shown in Section 3.4 of the alterations report. In addition, the following deviations were not included in Section 3.4:

1. Location NM445 was added because a surface water sampling location close to monitoring well NM442 was required. (Note: This location was identified as NM444 in the logbook.)

2. River locations (CC277, CC279, CC282, CC420, CC436, CC455, CC482, NM435, NM443, and NM458) were resampled approximately one month after the initial sampling. These were resampled in order to obtain analytical data from these locations on the same day as analytical data was obtained from nearby monitoring wells.

Field Sampling Plan Alterations for
FSPA No. 11A

FIELD SAMPLING PLAN ALTERATIONS
FOR THE COEUR D'ALENE BASIN-WIDE RI/FS

FIELD SAMPLING PLAN NO. 11A
TIER 2 SOURCE AREA CHARACTERIZATION

Prepared by
URS Greiner, Inc.
2401 Fourth Avenue, Suite 808
Seattle, Washington 98121

and

CH2M HILL
777 108th Avenue NE
Bellevue, Washington 98009

Prepared for
U. S. Environmental Protection Agency
Work Assignment No. 54-50-OC2Q
Contract No. 68-W-98-228
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

URSG DCN 4162500.5721.05.b

February 2000

CONTENTS

TABLES

ABBREVIATIONS AND ACRONYMS

btoc	below top of casing
CC	Canyon Creek
CDRB	Coeur d'Alene River Basin
cfs	cubic feet per second
°C	degrees Celsius
EPA	United States Environmental Protection Agency
ER	equipment rinsate
FD	field duplicate
FSPA	field sampling plan addendum
IN-CLP	inorganic analysis, Contract Laboratory Program
MS/MSD	matrix spike/matrix spike duplicate
H_2SO_4	sulfuric acid
HDPE	high density polyethylene
HNO_3	nitric acid
ILCO	inorganic low concentration analytical method
mg/L	milligram per liter
mS/cm	milli Siemens per centimeter
mV	millivolt
MW	monitoring well
NaOH	sodium hydroxide
NM	Ninemile Creek
NTU	nephelometric turbidity unit
ORP	oxidation-reduction potential
PC	Pine Creek
QA	quality assurance
QC	quality control
RI/FS	remedial investigation/feasibility study
RTN	regional tracking number
RV	river
SF	South Fork of the Coeur d'Alene River
SFCDR	South Fork of the Coeur d'Alene river
SU	standard unit
SWRI	Southwest Research Institute
TDS	total dissolved solids
TR	traffic report
TSS	total suspended solids
URSG	URS Greiner, Inc.
ZnAc	zinc acetate

1.0 INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W-98-228 and Work Assignment No. 027-RI-CO-102Q, URS Greiner, Inc. (URSG) collected surface water and groundwater samples within the Coeur d'Alene River Basin (CDRB) in Shoshone County, Idaho. This alteration report provides a summary of the modifications implemented for the work performed under *Field Sampling Plan Addendum (FSPA) 11A – Tier 2 Source Area Characterization* (EPA 1999). This report includes supplemental information to the *Generic Field Sampling Plan and Generic Quality Assurance Project Plan for the Bunker Hill Facility Project* (EPA 1997a) and the *Health and Safety Plan for the Bunker Hill Facility Project* (EPA 1997b).

The field efforts performed under FSPA 11A included collection of groundwater samples from 41 monitoring wells, collection of water samples from 22 surface water locations, and performance of 17 hydrogeologic tests, as planned. Monitoring wells along Canyon Creek, Ninemile Creek, and Pine Creek (installed and developed in November 1998 during FSPA 8 [EPA 1998]) were sampled during this field effort. Surface water samples were collected from Canyon Creek, Ninemile Creek, and Pine Creek at locations near selected monitoring wells. All of these field tasks were completed during November 29 through December 8, 1999.

2.0 PURPOSE

The purpose of this sampling effort was to collect data to be used to evaluate human and ecological risk and remedial alternatives for the remedial investigation/feasibility study (RI/FS) of the South Fork of the Coeur d'Alene River (SFCDR) basin. The RI/FS will be published at a later date.

3.0 SCOPE

The scope of this field effort consisted of three tasks.

3.1 TASK 1 - MONITORING WELL SAMPLING

Depth to groundwater was measured and field parameters were recorded in 41 monitoring wells located along Canyon Creek, Ninemile Creek, and Pine Creek, as planned. All of the wells installed in November 1998 were resampled during this field effort (piezometers were not sampled) as planned. Groundwater samples were collected from each monitoring well using low flow sampling methods, with either a peristaltic or grundfos pump, however one well (CC432) required the use of a bailer. At 11 selected monitoring wells water samples were collected at two discrete depths as planned. These wells were selected based on the 1998 results (high concentrations or stratified data).

Specifically, the following samples were collected from the wells:

- Canyon Creek: collected 47 water samples from 34 monitoring wells
- Ninemile Creek: collected 9 water samples from 6 monitoring wells
- Pine Creek: collected 2 water samples from 1 monitoring well

Water samples were collected from monitoring wells NM444, CC431, and CC437 using a grundfos pump. Water from CC432 was collected using a bailer. All other wells were sampled using a peristaltic pump.

3.2 TASK 2 - SURFACE WATER SAMPLING

Surface water samples were collected at 22 locations along Canyon Creek, Ninemile Creek, and Pine Creek as planned. These sample locations were co-located with specific monitoring wells and the samples were collected within 2 hours of the groundwater sample. Stream flow was measured and field parameters were recorded at each stream sampling location.

Specifically, the following samples were collected at the surface water locations:

- Canyon Creek: collected 20 water samples from 19 surface water stations

- Ninemile Creek: collected 3 water samples from 2 surface water stations

- Pine Creek: collected 1 water sample from 1 surface water station (the site designation is SF, however, the station is located on Pine Creek)

The stream flow was measured at all of these surface water stations using a Marsh-McBirney Flowmate 2000 flow meter, following the Area-Velocity Method Stream Flow Measurement Procedure presented in Appendix B of FSPA 11A. The other methods (i.e., Portable Cutthroat Flume, and Time and Discharge Method) presented in Appendix B of FSPA 11A were not used during this field event.

3.3 TASK 3 - SLUG TESTING

Seventeen monitoring wells were selected for hydrogeologic (slug) testing. These wells were selected in floodplain areas where groundwater recharge is anticipated to occur and in steeper areas to provide data to better understand the entire basin. Slug tests were not performed during the field efforts for FSPA 8. All 17 wells selected were slug tested during this field effort.

4.0 SAMPLE COLLECTION

All three tasks were successfully completed during this field effort. Table 4-1 lists the samples collected (a total of 74 environmental samples), depth of sampling for monitoring wells (depth below top of casing in feet), URSG and EPA sample numbers, date and time of collection, and quality control (QC) samples. Appropriate QC samples were collected: equipment rinsates (at least 1 per day), field duplicates (8 duplicates for 74 environmental samples, 10 percent), and matrix spike/matrix spike duplicates (MS/MSD) (5 MS/MSDs for 82 samples, 5 percent).

4.1 ALTERATIONS TO FSPA 11A

Collection of field parameter data (Table 4-2) was impacted at the following locations:

- Turbidity readings were not recorded due to a faulty sensor at the following locations: CC282, CC440, CC449, and CC485.
- Dissolved oxygen (DO) readings were not recorded due to sensor malfunction at the following locations: CC437, NM422, and NM444.
- Oxidation reduction potential (ORP) values were not recorded due to meter malfunction at the following locations: CC276, CC277, CC279, CC392, CC410, CC411, CC415, CC418, CC420, CC421, and NM442.
- ORP values were not recorded at the following locations due to cold weather impacts on the meter: CC286, CC434, CC439. CC462, and CC468.
- Field parameters were not recorded at location CC432 because collection of the sample was performed after the well bailed dry and had recharged. Insufficient water volume was available to record field parameters.

4.2 TASK 1 - MONITORING WELL SAMPLING

Depth to groundwater was measured (Table 4-1) and field parameters (Table 4-2) were recorded in the monitoring wells. Groundwater samples were collected from each monitoring well (Table 4-1) using low flow or bailer sampling methods. At 11 selected monitoring wells water samples were collected at two discrete depths (Table 4-1).

4.2.1 Alterations to FSPA 11A

Five alterations were performed during this field effort during monitoring well sampling. Designated depths for well sample collection was presented in Table 3-6 of FSPA 11A. The actual depth at which a sample was collected (depth below top of casing [btoc]) was altered during the field effort at the following wells:

- CC 462—shallow sample collection depth was increased from 7 feet (ft) btoc to 9 ft btoc because the top of the screened interval was located at 8.17 ft btoc, the sample location was lowered to be collected within the screened interval.

- CC 463—sample collection depth was increased from 7 ft btoc to 9 ft btoc because the top of the screened interval was located at 8.3 ft btoc, the sample location was lowered to be collected within the screened interval.

- CC 469—sample collection depth was increased from 7.8 ft btoc to 10 ft btoc because the top of the screened interval was located at 8.7 ft btoc, the sample location was lowered to be collected within the screened interval.

- CC 480—sample collection depth was increased from 11 ft btoc to 12.7 ft btoc because the well was pumped dry using the low flow purging method, in order to collect sufficient sample, the sample depth was lowered.

- SF 432—sample collection depth was increased from 15 ft btoc to 17 ft btoc because the measured depth to water was located at 14.90 ft btoc, the sample location was lowered to be collected 2 feet below the water surface.

One additional monitoring well alteration occurred at location CC432 where the low flow sampling method using the grundfos pump was not effective. It was necessary to use a bailer at this location, the well was bailed dry, allowed to recharge, and then sampled using the bailer.

4.3 TASK 2 - SURFACE WATER SAMPLING

Surface water flow was measured and field parameters were recorded at all 22 surface water stations. The field data are presented in Table 4-2. Water samples were collected at each station (Table 4-1) using the established protocol. These samples were collected within two hours of the co-located groundwater sample.

4.3.1 Alterations to FSPA 11A

One alteration was performed during the surface water field effort: the designated field duplicate at station CC457 was not collected. This field duplicate was inadvertently missed due to the page break in Table 3-3 of FSPA 11A.

Table 3-7 in FSPA 11A listed the co-located surface water and monitoring well stations. The text in FSPA 11A incorrectly identified 10 surface water locations to be associated with monitoring wells (page 3-4, Section 3.3), this was revised to reflect all 22 surface water stations to be associated with monitoring wells (as identified in Table 3-7). Sampling at the surface water station was intended to be performed immediately after the groundwater sample was collected. The field effort successfully collected the co-located samples within the shortest period of time possible. For some locations, multiple monitoring wells or multiple well depths resulted in an increased period of time between collection of the surface water and all the groundwater samples. However, the general time between collection of the surface water and associated groundwater samples was less than 2 hours [ranging from same time (separate crews perform each sampling effort) to 1 hour and 45 minutes]. Generally, climate conditions during the groundwater and surface water sample collection events remained constant (i.e., constant dry, rain, or snow conditions).

4.4 TASK 3 - SLUG TESTING

Slug tests were performed at the 17 designated monitoring wells as specified in FSPA 11A.

4.4.1 Alterations to FSPA 11A

- Rising and falling head tests were performed at the following monitoring wells: CC440, CC462, CC463, and CC468.

- Rising head tests were performed at the remaining monitoring wells where the screened interval was unsaturated, which does not allow for the falling head test to be performed: NM441, NM442, NM459, CC418, CC422, CC441, CC453, CC456, CC459, CC460, CC464, CC465, and CC467.

Table 4-1
Sample Summary Table

Site	Loc	Type	Depth to Water (ft btoc)	Sample Depth (ft btoc)	URS	RTN	Date	Time	Notes
CC	276	RV	NA	NA	61398	99494280	12/5/99	1040	
CC	277	RV	NA	NA	61465	99494279	12/5/99	910	
CC	279	RV	NA	NA	61387	99494265	12/4/99	1115	MS/MSD
CC	282	RV	NA	NA	61402	99494250	12/3/99	1440	
CC	286	RV	NA	NA	61478	99494256	12/4/99	1135	
CC	392	RV	NA	NA	61411	99504202	12/6/99	1025	MS/MSD
CC	401	MW	13.32	21	61399	99504200	12/6/99	1041	
CC	402	MW	13.02	20	61461	99494277	12/5/99	1435	
CC	403	MW	10.92	19	61475	99494276	12/5/99	1325	
CC	409	MW	12.56	20	61472	99494274	12/5/99	1040	
CC	409	MW	12.56	20	61474	99494275	12/5/99	1040	FD
CC	410	RV	NA	NA	61484	99494282	12/5/99	1420	
CC	411	RV	NA	NA	61486	99494281	12/5/99	1300	MS/MSD
CC	414	MW	6.81	14	61473	99494273	12/5/99	925	
CC	415	MW	12.23	19.5	61464	99494278	12/5/99	905	
CC	417	MW	3.18	11	61482	99494264	12/4/99	1536	
CC	418	MW	12.8	20	61467	99494268	12/4/99	1520	
CC	419	MW	9.15	11	61481	99494263	12/4/99	1426	
CC	420	RV	NA	NA	61466	99494267	12/4/99	1450	
CC	421	RV	NA	NA	61463	99494266	12/4/99	1353	
CC	422	MW	7.35	9	61483	99494261	12/4/99	1135	
CC	422	MW	7.35	9	61479	99494262	12/4/99	1135	FD
CC	423	MW	7.59	9.5	61450	99494259	12/4/99	900	
CC	431	MW	69.65	72	61436	99494219	12/2/99	1045	
CC	432	MW	29.42	32	61424	99494240	12/3/99	855	
CC	433	MW	10.42	12	61480	99494260	12/4/99	1010	
CC	434	MW	8.6	16.5	61470	99494257	12/4/99	1400	
CC	436	RV	NA	NA	61458	99494269	12/4/99	900	
CC	437	MW	107.94	127	61435	99494204	12/1/99	1521	
CC	437	MW	107.94	127	61442	99494205	12/1/99	1521	FD
CC	438	RV	NA	NA	61468	99494270	12/4/99	945	
CC	438	RV	NA	NA	61469	99494271	12/4/99	945	FD

Table 4-1 (Continued)
Sample Summary Table

Site	Loc	Type	Depth to Water (ft btoc)	Sample Depth (ft btoc)	URS	RTN	Date	Time	Notes
CC	439	RV	NA	NA	61471	99494258	12/4/99	1503	
CC	440	MW	10.22	18	61446	99494251	12/3/99	1540	
CC	441	MW	7.77	15	61397	99494239	12/3/99	1537	
CC	449	MW	10.4	13	61454	99494249	12/3/99	1335	
CC	451	MW	7.55	9.5	61417	99494247	12/3/99	955	
CC	452	MW	5.71	13.5	61390	99494223	12/2/99	1020	
CC	453	MW	9.76	12	61389	99494233	12/2/99	1650	
CC	453	MW	9.76	32.5	61433	99494234	12/2/99	1730	
CC	454	RV	NA	NA	61396	99494224	12/2/99	1130	MS/MSD
CC	455	RV	NA	NA	61384	99494227	12/2/99	1700	
CC	456	MW	6.05	8	61430	99494228	12/2/99	1030	
CC	456	MW	6.05	8	61440	99494229	12/2/99	1030	FD
CC	457	RV	NA	NA	61386	99494230	12/2/99	1500	
CC	459	MW	11.08	16.8	61456	99494243	12/3/99	1204	
CC	459	MW	11.08	45.7	61455	99494244	12/3/99	1249	
CC	460	MW	7.23	7.8	61425	99494245	12/3/99	1449	
CC	460	MW	7.23	47.6	61457	99494246	12/3/99	1539	
CC	462	MW	5.08	9	61476	99494254	12/4/99	930	
CC	462	MW	5.08	32	61477	99494255	12/4/99	1050	
CC	463	MW	6.04	9	61382	99494225	12/2/99	1415	
CC	463	MW	6.04	63	61383	99494226	12/2/99	1510	
CC	464	MW	15.37	18	61414	99494241	12/3/99	1006	
CC	464	MW	15.37	63	61415	99494242	12/3/99	1056	
CC	465	MW	6.44	9	61431	99494231	12/2/99	1235	
CC	465	MW	6.44	51	61432	99494232	12/2/99	1315	
CC	467	MW	4.39	7	61426	99494221	12/2/99	1513	
CC	467	MW	4.39	42.5	61427	99494222	12/2/99	1603	
CC	468	MW	2.76	5	61381	99494201	11/30/99	1500	
CC	469	MW	5.83	10	61380	99494200	11/30/99	1235	
CC	480	MW	8.45	12.7	61406	99494208	12/1/99	1005	
CC	481	MW	9.51	11.5	61404	99494209	12/1/99	1430	
CC	481	MW	9.51	11.5	61405	99494217	12/1/99	1430	FD
CC	482	RV	NA	NA	61403	99494207	12/1/99	919	

Table 4-1 (Continued)
Sample Summary Table

Site	Loc	Type	Depth to Water (ft btoc)	Sample Depth (ft btoc)	URS	RTN	Date	Time	Notes
CC	484	RV	NA	NA	61416	99494248	12/3/99	1045	
CC	485	RV	NA	NA	61449	99494252	12/3/99	1650	
NM	422	MW	13.82	16	61439	99494202	12/1/99	951	
NM	441	MW	9.45	12	61421	99494214	12/1/99	1515	
NM	441	MW	9.46	43	61423	99494215	12/1/99	1615	
NM	442	MW	8.28	9	61400	99504202	12/6/99	1315	
NM	442	MW	8.28	32	61401	99504203	12/6/99	1400	
NM	442	MW	8.28	32	61459	99504204	12/6/99	1400	FD
NM	443	RV	NA	NA	61407	99494210	12/1/99	1540	
NM	443	RV	NA	NA	61422	99494218	12/1/99	1540	FD
NM	444	MW	74.51	78	61441	99494203	12/1/99	1149	
NM	458	RV	NA	NA	61434	99494213	12/1/99	1155	
NM	459	MW	4.86	6.4	61429	99494212	12/1/99	1040	
NM	460	MW	5.04	7	61428	99494211	12/1/99	905	
PC	313	RV	NA	NA	61447	99494238	12/3/99	1155	MS/MSD
SF	432	MW	14.90	17	61452	99494237	12/3/99	910	
SF	432	MW	14.91	58	61451	99494236	12/3/99	1020	
QA	901-1	ER	NA	NA	61391	99494206	12/1/99	1715	CC437[a]
QA	901-2	ER	NA	NA	61438	99494216	12/1/99	1800	NM443
QA	901-3	ER	NA	NA	61437	99494220	12/2/99	1130	CC431
QA	901-4	ER	NA	NA	61412	99494235	12/2/99	1840	CC467
QA	901-5	ER	NA	NA	61453	99494253	12/3/99	1730	PC313
QA	901-6	ER	NA	NA	61413	99494272	12/4/99	1800	CC420
QA	901-7	ER	NA	NA	61485	99494283	12/5/99	1630	CC410
QA	901-8	ER	NA	NA	61409	99504205	12/6/99	1530	CC392

[a]Surface water/monitoring well station noted for QA 901 samples indicates the station where the equipment was used prior to decontamination and collection of the equipment rinsate sample.

Notes:
btoc - below top of casing
CC - Canyon Creek
ER - equipment rinsate
FD - field duplicate
ft - feet
MS/MSD - matrix spike/matrix spike duplicate

Table 4-1 (Continued)
Sample Summary Table

MW - monitoring well
NA - not applicable
NM - Ninemile Creek
PC - Pine Creek
QA - quality assurance
RTN - regional tracking number
RV - river
SF - South Fork of the Coeur d'Alene River (actual location for SF 432 is on Pine Creek)

Table 4-2
Field Parameters

Site	Loc	Type	Sample Depth (ft btoc)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Stream Flow (cfs)
CC	276	RV	NA	6.0	0.003	0	11.6	2	NA	20.8
CC	277	RV	NA	5.3	0	0	12.5	1	NA	21.5
CC	279	RV	NA	7.09	0.049	16	10	1.7	NA	21.47
CC	282	RV	NA	7.1	0.02	NA	8.6	3	46	32
CC	286	RV	NA	6.96	0.068	0	14.47	0.07	NA	31.4
CC	392	RV	NA	5.8	0.10	0	12.9	3	NA	0.985
CC	401	MW	21	5.3	0.023	0	10.08	5.7	140	NA
CC	402	MW	20	6.74	0.109	2	6.60	6.9	154.7	NA
CC	403	MW	19	7.16	0.117	0	10.12	6.1	234.2	NA
CC	409	MW	20	7.0	0.094	0	8.74	5.2	262	NA
CC	410	RV	NA	5.9	0.05	0	10.2	1	NA	14.32
CC	411	RV	NA	6.9	0.03	0	10.6	2	NA	24.36
CC	414	MW	14	5.92	0.067	0	10.19	4.9	186	NA
CC	415	MW	19.5	5.1	0.20	0	7.5	6	NA	NA
CC	417	MW	11	6.93	0.077	0	8.51	5.0	190.1	NA
CC	418	MW	20	6.87	0.067	0	7.01	4.1	NA	NA
CC	419	MW	11	7.05	0.050	1	8.93	7.1	193.6	NA
CC	420	RV	NA	7.25	0.044	1	9.43	2.0	NA	20.83
CC	421	RV	NA	7.08	0.047	94	10.36	2.5	NA	24.2
CC	422	MW	9	6.5	0.155	0	6.98	6.5	221.9	NA
CC	423	MW	9.5	6.51	0.081	0	8.64	7.2	176.9	NA

Table 4-2 (Continued)
Field Parameters

Site	Loc	Type	Sample Depth (ft btoc)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Stream Flow (cfs)
CC	431	MW	72	6.48	0.047	15	9.96	8.6	161.6	NA
CC	432	MW	32	NA	NA	NA	NA	NA	NA	NA
CC	433	MW	12	7.29	0.101	0	6.87	6.5	191.5	NA
CC	434	MW	16.5	6.8	0.120	0	7.5	6.0	NA	NA
CC	436	RV	NA	6.16	0.088	17	9.92	1.9	80	25.85
CC	437	MW	127	7.34	0.049	34	NA	9.2	226.6	NA
CC	438	RV	NA	6.77	0.055	0	9.3	1.7	72	24.34
CC	439	RV	NA	7.1	0.01	0	13.7	2.0	NA	30.52
CC	440	MW	18	6.23	0.082	NA	7.17	8.2	104	NA
CC	441	MW	15	6.22	0.123	1	7.03	9.4	146	NA
CC	449	MW	13	6.07	0.048	0	8.14	6.7	71/340	NA
CC	451	MW	9.5	5.3	0.095	0	6.06	8.4	106/370	NA
CC	452	MW	13.5	5.25	0.136	0	7.17	8.4	182	NA
CC	453	MW	12	5.9	0.225	0	6.09	7.2	30/330	NA
CC	453	MW	32.5	5.89	0.222	0	6.45	7.4	35/395	NA
CC	454	RV	NA	5.94	0.053	0	13.58	3.9	177	33.05
CC	455	RV	NA	6.51	0.058	0	13.46	3.5	182	32.93
CC	456	MW	8	6.81	0.324	0	6.27	7.8	305/93	NA
CC	457	RV	NA	7.48	0.112	0	10.6	3.6	NA	42
CC	459	MW	16.8	6.38	0.167	0	8.93	5.4	266.1	NA

Table 4-2 (Continued)
Field Parameters

Site	Loc	Type	Sample Depth (ft btoc)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Stream Flow (cfs)
CC	459	MW	45.7	6.4	0.162	3	8.55	5.8	288.3	NA
CC	460	MW	7.8	6.09	0.102	0	7.79	8.0	237.9	NA
CC	460	MW	47.6	6.04	0.109	0	6.29	8.7	246.3	NA
CC	462	MW	9	6.36	0.284	5	1.69	4.5	NA	NA
CC	462	MW	32	6.04	0.265	30	1.27	5.9	NA	NA
CC	463	MW	9	5.81	0.212	1	7.81	7.1	212	NA
CC	463	MW	63	5.65	0.213	40	6.31	7.8	216	NA
CC	464	MW	18	5.39	0.419	0	7.29	8.1	282.1	NA
CC	464	MW	63	5.98	0.600	4	1.60	8.8	271.1	NA
CC	465	MW	9	7.24	0.151	0	8.54	4	305/41	NA
CC	465	MW	51	7.38	0.168	8	8.44	5	300/19	NA
CC	467	MW	7	6.65	0.233	0	6.86	8.7	177.3	NA
CC	467	MW	42.5	5066	0.234	2	6.98	9.0	203.6	NA
CC	468	MW	5	6.58	0.132	3	5.65	8.8	NA	NA
CC	469	MW	10	5.42	0.250	0	0.43	9.0	-102	NA
CC	480	MW	12.7	7.21	0.626	8	6.75	7.4	205	NA
CC	481	MW	11.5	7.09	0.246	0	7.74	7.5	160	NA
CC	482	RV	NA	7.23	0.092	0	9.97	4.7	50	36
CC	484	RV	NA	6.7	0.063	0	8.83	2.8	124/250	33
CC	485	RV	NA	6.87	0.059	NA	8.31	2	95	27.61

Table 4-2 (Continued)
Field Parameters

Site	Loc	Type	Sample Depth (ft btoc)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)	Stream Flow (cfs)
NM	422	MW	16	5.53	0.101	11	NA	5	394.6	NA
NM	441	MW	12	5.43	0.122	0	3.35	8.6	237	NA
NM	441	MW	43	7.06	0.381	9	6.62	7.3	-96	NA
NM	442	MW	9	5.10	0.480	0	0.03	8	NA	NA
NM	442	MW	32	5.10	0.440	3	0.14	8.9	NA	NA
NM	443	RV	NA	7.25	0.138	0	10.75	3.8	280	8.43
NM	444	MW	78	7.48	1.16	122	NA	15.2	233.4	NA
NM	458	RV	NA	6.99	0.141	0	12.83	4.4	70	11.62
NM	459	MW	6.4	6.74	0.230	0	8.74	6.8	-42	NA
NM	460	MW	7	6.75	0.280	0	10.35	7.8	75	NA
PC	313	RV	NA	5.77	0.025	1	11.79	6.0	120	160.5
SF	432	MW	17	5.0	0.029	0	9.79	7.0	-228	NA
SF	432	MW	58	5.36	0.025	16	9.26	7.0	-58	NA

Notes:
°C - degrees Celsius
CC - Canyon Creek
cfs - cubic feet per second
ft btoc - feet below top of casing
mg/L - milligrams per liter
mS/cm - micro Siemens per centimeter
mV - millivolt

Table 4-2 (Continued)
Field Parameters

MW - monitoring well
NA - not available
NM - Ninemile Creek
NTU - nephelometric turbidity units
PC - Pine Creek
RV - river
SF - South Fork of the Coeur d'Alene River (actual location for SF 432 is on Pine Creek)
SU - standard units

5.0 SAMPLE MANAGEMENT

Processing of the samples required detailed preparation and handling. Two laboratories were assigned for the sample analyses and different chain of custody paperwork was required. Each water sample was assigned two sample numbers (listed in Table 4-1): five digit URSG sample number (e.g., 61398), and eight digit EPA regional tracking number (RTN) (e.g., 99494280). Two laboratories were assigned for this project:

- EPA Region 10 Laboratory (Manchester), 7411 Beach Drive East, Port Orchard, Washington, 98366, Attn: Sharyl Hill, 360-871-0748

- Southwest Research Institute (SWRI), 6220 Culebra Road, San Antonio, Texas, 78228, Attn: Herb Schattenberg, 210-522-3051

The EPA-assigned tracking information included the following:

- Project Code: TEC-618G
- Account Code: 00T10P50102D102QLA00
- Case Number: not required for this project
- Site Spill ID: 2Q

All surface water and groundwater samples were collected in 8 containers (double volume was collected for matrix spike/matrix spike duplicate samples, 16 containers) and shipped to the laboratories identified in Table 5-1. The analyses identified in Table 5-1 were requested for all environmental and field duplicate samples collected. Equipment rinsate samples were submitted to the laboratory for analysis of total and dissolved inorganics, nitrate/nitrite, chloride/sulfate, and sulfide.

5.1 ALTERATIONS TO FSPA 11A

Table 3-5 of FSPA 11A incorrectly identified the preservative required for the sample collected for nitrate/nitrite analysis. The correct preservative for this sample is sulfuric acid (H_2SO_4), not the nitric acid ($HN0_3$) listed in the original table. This error was recognized at the beginning of the field effort and the correct preservative was used for all samples.

Table 5-1
Laboratory Summary Table

Analysis	Method	Bottle Type	Laboratory
IN-CLP Low, total	ILCO 3.1	1 L HDPE, HNO_3	SWRI
IN-CLP Low, dissolved	ILCO 3.1	1 L HDPE, field filtered, HNO_3	SWRI
Sulfide	376.1	500 mL, NaOH ZnAc	SWRI
Alkalinity, carbonate, bicarbonate	2320 B	500 mL	Manchester
Chloride, sulfate	300.0	250 mL	Manchester
Hardness	130.1	250 mL, HNO_3	Manchester
Nitrate, nitrite	353.2	250 mL, H_2SO_4	Manchester
TDS, TSS	160.1/160.2	1 L HDPE	Manchester

Notes:
H_2SO_4 - sulfuric acid
HDPE - high density polyethylene
HNO_3 - nitric acid
NaOH - sodium hydroxide
SWRI - Southwest Research Institute
TDS - total dissolved solids
TSS - total suspended solids
IN-CLP - inorganic analysis
ZnAc - zinc acetate

6.0 SAMPLE TRACKING

During 9 days of field work one sample tracking error was noted while in the field and corrected as indicated:

- One sample container was mislabeled and shipped to Manchester on 12/06/99 (listed on traffic report [TR] number 10-421933346-120599-0004 under Fedex airbill 810854068917). The nitrate/nitrite tag and label for sample 99494273 were incorrect. The remaining containers for sample 99494273 were correctly labeled and tagged (collected on 12/05/99 at 0925 at station location CC414). The mislabeled nitrate/nitrite container was collected as sample 99494276 on 12/05/99 at 1325 at station location CC403.

- The subsequent sample shipment to Manchester, on 12/07/99, contained the appropriate containers to complete the required analyses at both sample locations (TR 10-4219333346-120699-0001 under Fedex airbill 808709658207). The nitrate/nitrite container for sample 99494273 was included on TR 10-4219333346-120699-0001. The remaining sample containers for sample 99494276 were included on TR 10-4219333346-120699-0001.

- This information was documented in a memorandum to the RSCC on 12/06/99 requesting that the laboratory correct the tag and label as indicated.

7.0 PROJECT CONTACTS AND SCHEDULE

No changes were made to the contacts listed in Section 8 of FSPA 11A

The field effort was completed within the projected schedule as listed in Section 8 of FSPA 11A.

8.0 REFERENCES

U.S. Environmental Protection Agency (EPA). 1999. *Field Sampling Plan for the Coeur d'Alene Basin-Wide RI/FS, Addendum No. 11A – Tier 2 Source Area Characterization Field Sampling Plan*. Prepared by URS Greiner, Inc., under Contract No. 68-W-98-228. November 22, 1999.

———. 1998. *Field Sampling Plan for the Bunker Hill/Coeur d'Alene Basin-Wide RI/FS, Addendum No. 8 – Tier 2 Source Area Characterization*. Prepared by URS Greiner, Inc., under Contract No. 68-W9-0054. October 2, 1998.

———. 1997a. *Generic Field Sampling Plan and Generic Quality Assurance Project Plan for the Bunker Hill Facility Project*. Prepared by URS Greiner, Inc., under Contract No. 68-W9-0054.

———. 1997b. *Health and Safety Plan for the Bunker Hill Facility Project*. Prepared by URS Greiner, Inc., under Contract No. 68-W9-0054.

Field Sampling Plan Alterations for
FSPA No. 12

DRAFT
FIELD SAMPLING PLAN
ALTERATIONS
COEUR D'ALENE BASIN-WIDE RI/FS
SHOSHONE COUNTY, IDAHO

ADDENDUM 12

Residential Sampling to Support the Human Health Risk Assessment

Prepared by
URS Greiner, Inc.
2401 Fourth Avenue, Suite 808
Seattle, Washington 98121

and

CH2M HILL
777 108th Avenue NE
Bellevue, Washington 98009

Prepared for
U.S. Environmental Protection Agency
Work Assignment No. 027-R1-C0-102Q
Contract No. 68-W-98-228
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

URSG DCN 4162500.5436.05.b

October 1999

CONTENTS

TABLE

ABBREVIATIONS AND ACRONYMS

bgs	below ground surface
BHF	Bunker Hill Facility
CDRB	Coeur d'Alene River Basin
CLP	contract laboratory program
Corps	United States Army Corps of Engineers
EPA	United States Environmental Protection Agency
FSP	field sampling plan
HDPE	high density polyethylene
ITR	inorganic traffic report
MS	matrix spike
MSD	matrix spike duplicate
RAP	regional analytical protocol
RSCC	Regional Sample Control Coordinator
RTN	regional tracking number
URSG	URS Greiner, Inc.

FIELD SAMPLING PLAN ADDENDUM 12 ALTERATIONS

Field Sampling Plan Addendum No. 12
Call-In Residential Sampling to Support the Human Health Risk Assessment

1.0 INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W-98-228 and Work Assignment No. 027-R1-C0-102Q, URS Greiner, Inc. (URSG) performed soil sampling at selected residential properties within the Bunker Hill Facility/Coeur d'Alene River Basin (BHF/CDRB) in Shoshone County, Idaho. Areas within the BHF/CDRB have been impacted as a result of releases of metals from mining activities and operations and the use of mining waste (import material) during construction activities.

This document provides a summary of the modifications implemented for the work performed under Field Sampling Plan Addendum (FSPA) 12, *Call-In Residential Sampling to Support the Human Health Risk Assessment* (URSG 1998b). This includes supplemental information to the *Generic Field Sampling Plan and Generic Quality Assurance Project Plan for the Bunker Hill Facility Project* (URS 1997a).

The field efforts performed under FSPA 12 occurred during April and May of 1999. A total of 36 residences were visited and included residential soil sampling at 33 residences and drinking water sampling at 14 residences within the basin. At 3 of the 36 residences, sampling was limited to drinking water only. FSPA 12 originally anticipated sampling at a total of 45 residential properties.

2.0 PURPOSE AND SCOPE

The purpose of the FSPA 12 sampling effort was to provide analytical data that would be used to help identify soils at residential properties that could require an early removal action by the EPA. In addition, soil data would be potentially useful in helping to evaluate direct exposure pathways to residences while playing, gardening or conducting other recreational activities at their homes. To assess groundwater exposure pathways, water samples were collected at residences connected to private wells (non-municipal source). The properties identified for the sampling effort were residents who called the EPA and requested sampling to be performed at their homes.

The scope of this field effort consisted of 2 tasks:

- Task 1 – Collection of residential soil samples

Samples from up to 8 locations were to be collected at each residence. The yard soil sample locations were to be proportionally distributed throughout each residential property. Play and garden areas, if present, were to be included as two of the five yard sample locations. The samples were to be collected at 4 discrete depths: 0 to 1 inch below ground surface (bgs), 1 to 6 inches bgs, 6 to 12 inches bgs, and 12 to 18 inches bgs. At one of the 5 locations, an additional sample was to be collected at a fifth discrete depth, 18 to 24 inch bgs.

The biased soil samples were to be collected from the 0-1 inch depth interval. Two of the three biased soil samples were to be collected at the roof dripline (if no gutters were present) or downspouts (from the gutters). One biased soil sample was to be collected from the driveway, if it was not paved.

Identification of other discrete areas that may require sampling.

- Task 2 – Collection of drinking water samples

Two samples were to be collected from each residence that was supplied by private well. One sample was to be collected from a tap at the residence that had not been run for 6 hours ("first run") and the second sample was to be collected after the water had been run for at least 10 minutes ("flushed").

3.0 ALTERATIONS BY TASK

The following subsections provide a brief summary of the task, deviations to the task (if any) and the impact of the deviations on the study.

3.1 TASK 1: RESIDENTIAL SOIL SAMPLING

The objective of this task was to collect data to help identify residential properties that could require an early soil removal action by EPA. Table 1 summarizes the residential properties.

Deviation:

The response from property owners/renters was not sufficient to meet the planned sampling of 45 residential properties. Therefore, during FSPA 12 soil sampling was conducted at a total of 33 residential properties.

Impact:

No impact to the study is anticipated.

Deviation:

Not all planned depth intervals could be collected at each sample location because of obstructions (boulders, concrete, wood debris etc.). The biased driveway sample location was collected as a composite from 1-4 locations to obtain a sufficient quantity of sample for laboratory analysis.

Impact:

No impact to the study is anticipated.

3.2 TASK 2: DRINKING WATER SAMPLING

The objective of this task was to evaluate drinking water quality from residences utilizing private wells as their source for drinking water.

Deviation:

Drinking water samples were collected from 14 residences. Soil and drinking water samples were collected at 11 of the 14 residences and 3 residences were sampled for water only. At the direction of the WAM, sampling was expanded to include a community well system in addition to private wells as proposed in FSPA 12.

Impact:

No impact to the study is anticipated.

4.0 SAMPLE MANAGEMENT

Processing of the samples required detailed preparation and handling. Two sieve laboratories and two analytical laboratories were assigned for the sample analyses. This required the field crew to prepare two separate chain of custody procedures. The samples were sent to the sieve laboratory under a URSG chain of custody (COC) and internal tracking documentation. Clean-certified 4-ounce glass jars were affixed with an EPA Label and EPA Sample tags were prepared and included in the coolers with the corresponding sample to be sieved. The EPA labels included the assigned alphanumeric Contract Laboratory Program (CLP) sample number (e.g., MJN111), and an eight digit EPA regional tracking number (RTN) (e.g., 98451234). All drinking water samples were assigned only the URSG sample number and submitted directly to the laboratory subcontracted by URSG.

The EPA-assigned CLP tracking information included the following:

- Project Code: TEC-701I
- Account Code: 99T10P50102D102Q4L00
- Case Number: 26966
- Site Spill ID: 2Q

For this project laboratory matrix spike and matrix spike duplicate samples (MS/MSD) were designated (1 in 20 samples) by the CLP laboratory

4.1 SOIL

Soil samples were submitted to two different laboratories, the sieve labs (Hong West Associates and Soil Technology) and CLP lab (Sentinel). Each soil sample was collected in a quart ziploc bag and submitted to the sieve lab for processing through a #80 mesh sieve. The sieved portion was placed in a 4-ounce glass jar and submitted (by the sieve lab) to the CLP laboratory for inorganic analysis. The field crew prepared the CLP chain of custody (inorganic traffic report [ITR]) and sample tracking labels (bottles and EPA tags) for the sieve laboratory to use to collect the sieved portion of the sample.

5.0 ALTERATION TO THE FIELD SCHEDULE

The field operations schedule was decreased by 4 days. This was due to the lack of response from property owners or renters requesting sampling.

6.0 REFERENCES

URS Consultants, Inc. (URS). 1997a. *Generic Field Sampling Plan and Generic Quality Assurance Project Plan for the Bunker Hill Facility Project.* Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0054. July 30, 1997.

URS Greiner, Inc. (URSG). 1999. *Field Sampling Plan for the Bunker Hill Basin-Wide RI/FS Addendum No. 12: Call-In Residential Sampling to Support the Human Health Risk Assessment.* Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W9-0054. March 22, 1999.

———. 1998. *Bunker Hill Basin-Wide RI/FS Task Hazard Analysis of Residential Sampling, Addendum 12, April 26, 1999.* Prepared for the U.S. Environmental Protection Agency, Contract No. 68-W-98-228. April 26, 1999.

Table 1
FSPA 12 Residential Site Summary

Property Size	Septic	Garden (104)	Play Area (103)	Gravel Drive (102)	YD Sampled	Yard Sampled	Well Sampled
<1 acre	No	Yes	No	Yes	5/1/99	1	
<1 acre	No	No	No	No	4/30/99	1	
<1 acre	No	No	No	No	5/6/99	1	
<1 acre	No	No	No	No	5/6/99	1	
2.8 Acres	Yes	Yes	No	Yes	5/3/99	1	1
<1 acre	No	No	Yes	No	5/4/99	1	
<1 acre	No	No	No	Yes	5/4/99	1	
<1 acre	Aband.	Yes	No	Yes	5/4/99	1	
<1 acre	No	No	No	Yes	5/11/99	1	1
<1 acre	No	Yes	No	Yes	5/4/99	1	
<1acre	No	No	Yes	Yes	5/5/99	1	
<1acre	No	Yes	No	No	5/5/99	1	
<1 acre	No	No	No	Yes	5/5/99	1	
2/3 Acre	No	No	No	Yes	5/6/99	1	
~1 Acres	Yes	No	No	Yes	5/5/99	1	1
50x120	No	No	No		5/6/99	1	
<1 acre	No	Yes	No	No	5/7/99	1	
<1 acre	No	Yes	No	No	5/7/99	1	
<1 acre	No	No	No	No	5/8/99	1	
<1 Acre	Yes	No	No	Yes	5/10/99	1	1
<1 acre	No	No	No	Yes	5/8/99	1	1
<1Acre	No	No	No	No	5/14/99	1	
75x120	No	No	No	No	5/11/99	1	
125x150	No	Yes	No	Yes	5/11/99	1	
<1 acre	No	No	No	No	5/11/99	1	
<1 acre	Yes	No	No	No	5/12/99	1	1
<1 acre	No	No	No	No	5/12/99	1	
<1 acre	No	No	No	Yes	5/13/99	1	1
< 1 Acre	No	No	Yes	Yes	5/13/99	1	1
< 1 Acre	No	No	No	Yes	5/14/99	1	1
<1acre	No	Yes	No	Yes	5/14/99	1	1
<1 acre	No	No	No	No	5/17/99	1	
< 1 Acre	Com.	Yes	No	Yes	5/18/99	1	1
<1 acre	No	No	No	Yes	5/14/99		1
<1 acre	Yes	No	No				1
1.25	Yes	No	No		5/14/99		1

Erratum for
Field Sampling Plan Alterations for
FSPA No. 12

ERRATUM FOR FSPA NO. 12 ALTERATION REPORT

One deviation was identified to the *Draft Field Sampling Plan Alterations for Bunker Hill Basin-Wide RI/FS Addendum No. 12 Call-In Residential Sampling To Support The Human Health Risk Assessment.* The deviation is described below:

- Section 3.2.3 of the Field Sample Plan states that drinking water samples were to be collected from interior taps. However, samples from six sites were collected from exterior taps. The site and sample numbers are listed below:

Site	Sample No.
115	50103, 50104
105	50101, 50102
126	50111, 50112
128	50115, 50116
143	50122, 50123, 50124, 50125
130	50117, 50118

Field Sampling Plan Alterations for
FSPA No. 16

FIELD SAMPLING PLAN ALTERATIONS FOR THE COEUR D'ALENE BASIN-WIDE RI/FS

FIELD SAMPLING PLAN NO. 16 SPRING 2000 CALL-IN RESIDENTIAL SAMPLING AND MULLAN FOOTBALL FIELD SAMPLING

Prepared by
URS Greiner, Inc.
2401 Fourth Avenue, Suite 808
Seattle, Washington 98121

and

CH2M HILL
777 108th Avenue NE
Bellevue, Washington 98009

Prepared for
U. S. Environmental Protection Agency
Work Assignment No. 54-50-OC2Q
Contract No. 68-W-98-228
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

URSG DCN 4162500.5862.05.a

August 2000

CONTENTS

ATTACHMENTS

TABLES

ABBREVIATIONS AND ACRONYMS

AAS	American Analytical Service
ASTM	American Society for Testing and Materials
CLP	Contract Laboratory Program
COC	chain of custody
D422	analytical method for soil sieving
EPA	United States Environmental Protection Agency
FSPA	field sampling plan addendum
HDPE	high density polyethylene
HNO_3	nitric acid
HWA	Hong West Associates
ILCO	inorganic low concentration method
ILMO	inorganic multi-media multi-concentration method
RTN	regional tracking number
URSG	URS Greiner, Inc.
WMGJ	wide mouth glass jar

1.0 INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W-98-228 and Work Assignment No. 027-RI-CO-102Q, URS Greiner, Inc. (URSG) collected soil and water samples within the Coeur d'Alene River Basin in Shoshone County, Idaho. This alteration report provides a summary of the modifications implemented for the work performed under *Field Sampling Plan Addendum (FSPA) 16 – Spring 2000 Call-In Residential and Mullan Football Field Sampling* (EPA 2000a). This work was also performed following the protocols presented in the *Generic Field Sampling Plan and Generic Quality Assurance Project Plan for the Bunker Hill Facility Project* (EPA 1997a) and the *Health and Safety Plan for the Bunker Hill Facility Project* (EPA 1997b). Prior to initiation of this field effort, EPA requested a reduction in field tasks. This reduction in effort was documented in an internal URSG memorandum which is provided as Attachment A to this report. The specific changes to the field effort identified in this memorandum are documented in this report. Also attached to this FSPA is a copy of the briefing sheet provided to the local residents (Attachment B).

The field efforts performed under FSPA 16 consisted of three tasks:

- Task 1 - Residential Yard Soil Sample Collection
- Task 2 - Private Water Supply Sample Collection
- Task 3 - Mullan Football Field Soil Sample Collection

These field efforts resulted in the collection of soil samples from 55 residential properties, 1 municipal park, and the Mullan Football Field. Drinking water samples were collected from 15 residences; 5 did not include yard soil sample collection. All of these field tasks were completed from March 20 through April 1, 2000.

2.0 PURPOSE

The purpose of the field efforts performed under FSPA 16 is summarized by task as follows:

- Task 1 - Residential Yard Soil Sample Collection: collect data on metal concentrations in surface and subsurface soils. These data will be used to evaluate whether the yard soil around the homes requires removal in order to protect health.

- Task 2 - Private Water Supply Sample Collection: collect data on metal concentrations in private drinking water supplies. These data will be used to evaluate the need for installation of drinking water filters or hook up to municipal water supply systems.

- Task 3 - Mullan Football Field Soil Sample Collection: collect data on metal concentrations in surface and subsurface soils at the specific recreational area. These data will be used to evaluate whether the soil at the football field requires removal in order to protect health.

3.0 SCOPE

The scope of this field effort consisted of three tasks.

- Task 1 - Residential Yard Soil Sample Collection
- Task 2 - Private Water Supply Sample Collection
- Task 3 - Mullan Football Field Soil Sample Collection

This section presents a short summary of the planned activities for each of these field tasks as detailed in FSPA 16. This summary is followed by discussion of changes that occurred during completion of the field effort.

3.1 TASK 1 - RESIDENTIAL YARD SAMPLE COLLECTION

3.1.1 FSPA 16

FSPA 16 specified the procedures to be followed to collect yard soil samples from a maximum of 75 residences. The sampling procedures are detailed in Section 3 of FSPA 16. A minimum of five yard sample locations were to be identified at each residence. Yard soil samples were to be collected from open areas where a majority of outside activity occurred. Composite soil samples were to be collected from each of the five yard sample locations at the following depths: 0 to 1 inch, 1 to 6 inches, 6 to12 inches, and 12 to18 inches below ground surface. In addition the field crew was to designate one of the five locations for a sample from 18 to 24 inches below ground surface. Additional soil samples were to be collected, when appropriate, at driveway and down spout sample locations. Driveway and down spout soil sample locations were limited to surface soil at 0 to 1 inch depths. Soil sampling locations were to be collected from the following areas:

- Three samples in the lawn/open areas in the front and back yards
- One sample from the center of a play area (if any existed)
- One sample from the center of a garden plot (if any existed)
- Two additional yard sample locations if no play area or garden was present
- Driveway sample location if a gravel or soil driveway was present
- Two down spout sample locations, one from each side of the roof pitch, if down spouts were present

A maximum total of 1,980 soil samples were anticipated to be collected. This total was based on a maximum of 24 samples (21 yard, 1 driveway, and 2 down spout samples) per residence for 75

residences plus 10 percent field duplicates (24 samples × 75 residences = 1800 samples + 180 duplicates = 1,980 samples). The samples were to be submitted to a geotechnical laboratory for sieving through a #80-mesh screen. The material passing the screen was to be submitted to a Contract Laboratory Program (CLP) laboratory for inorganic analysis. Section 4 contains details on the laboratories used for this field event.

3.1.2 FSPA 16 Alteration

A total of 56 properties were sampled for yard soil during FSPA 16. This total includes 53 private residences, 2 multiple use properties (an apartment complex and a trailer park), and 1 municipal park. The reduction in actual number of properties sampled is due to the response from the community to radio and newspaper advertisements used to solicit volunteers. All property owners that responded to the advertisement were included in FSPA 16 sampling effort unless previous sampling had been performed or the property had not yet been developed for residential use. In several instances, properties had previously been sampled under the authority of the State of Idaho. These residences were not resampled during this field effort.

A total of 1,471 soil samples (1,318 environmental and 153 field duplicates) were collected. Table 3-1 contains a summary of the samples collected during FSPA 16. Table 3-2 contains a summary list of the site numbers assigned to the residences, confidential residential information is not provided. Table 3-2 identifies the samples collected from each site, excluding field duplicates. Some sites were deleted after the site number was assigned, the list identifies those numbers.

Samples collected from the municipal park were submitted to the U.S. Army Corps of Engineers for inorganic analysis at a laboratory on a 2-day turnaround schedule. The results of these samples were needed promptly in order for the city to make decisions about renovation of the park.

Field deviations that occurred during FSPA 16 include additional soil samples collected due to large property; unable to collect soil sample because of rocks; inordinately small yard area and collection of fewer samples; or snow conditions limited the field sampling methods.

Site 205 - This site is an apartment complex. The physical size of the site is larger than a standard residence, therefore 8 yard sample locations were established.

Site 215 - Available surface area of this site was so small that only grab samples were collected from the yard soils instead of composite samples.

Site 220 - Deep snow at Site 220 limited the crew to the collection of 5 grab samples instead of 5 composite samples.

Site 235 - The field crew encountered refusal of the hand auger at a sample location 12 to 18 inches below ground surface because large quantities of cobble were present in the excavation. Therefore, the sample designated for this location (301-4) was not collected.

Site 244 - This site is a trailer park. The physical size of the site is larger than a standard residence, therefore 11 yard sample locations were established.

Site 247 - Available surface area of this site was so small that only grab samples were collected from the yard soils instead of composite samples.

Site 248 - This property is larger than a standard residence, therefore seven yard sample locations were established.

Site 261 - Available surface area of this site was so small that only grab samples were collected from the yard soils instead of composite samples

3.2 TASK 2 - PRIVATE WATER SUPPLY SAMPLE COLLECTION

3.2.1 FSPA 16

Drinking water samples were anticipated to be collected from a maximum of 75 private residences. No drinking water samples of municipal or community supplied water were to be collected because those water supplies are regulated by the Safe Drinking Water Act, which requires regular sampling. Residences that use a spring or groundwater well were to be included in this field effort.

FSPA 16 specified the procedures to be followed to collect drinking water samples from up to 75 private residences. The sampling procedures are detailed in Section 3 of FSPA 16. A total of 2 water samples were to be collected from each designated residence, an initial water sample (first draw water) from an unused interior tap (not used for the previous 6 hours) and a second water sample (purged water sample) after the tap flowed for 10 minutes.

A total of 165 drinking water samples were anticipated to be collected (2 samples × 75 residences = 150 samples + 15 duplicates = 165 samples). The samples were to be submitted to a laboratory for low concentration inorganic analysis. Section 4 contains details on the laboratories used for this field event.

3.2.2 FSPA 16 Alteration

A total of 15 properties were sampled for drinking water during FSPA 16. Only those residences on a private well or spring were included in the water sampling effort. Five properties were included in the water sampling task but not included in the yard soil sampling effort. All drinking water samples were collected as described in the protocol in FSPA 16. The only deviation from the protocol is Site 258 which is not a private residence. This site was added to the water sampling list at EPA's direction because the business uses a private groundwater well.

A total of 34 drinking water samples (30 environmental samples and 4 field duplicates) were collected during FSPA 16. Table 3-1 contains a summary of the samples collected during FSPA 16. Table 3-2 lists the residential sites where drinking water samples were collected.

3.3 TASK 3 - MULLAN FOOTBALL FIELD SOIL SAMPLE COLLECTION

3.3.1 FSPA 16

Mullan Football Field was initially scheduled for sampling under FSPA 13 (EPA 1999). Due to scheduling conflicts with the Mullan School District, sampling did not occur during FSPA 13. This site was included in FSPA 16 and coordinated with the school district schedule. The site consisted of three separate areas: Football Field, Parking Lot, and Other Open Areas. The sample quantities and site designations were developed in FSPA 13 and repeated in FSPA 16. The sampling method established for the football field was a transect method with sample locations randomly established along the equally spaced transects. Proposed sampling was to include 38 sites from the Football Field, 19 sites from the Parking Lot, and 21 sites from the Other Open Areas. Samples were to be collected from 0 to1 inch, 1 to 6 inches, 6 to12 inches, and 12 to18 inches.

A maximum total of 347 soil samples were anticipated to be collected. This total was based on 154 samples from the Football Field, 76 samples from the Parking Lot, 85 samples from the Other Open Areas, and 32 field duplicates. The samples were to be submitted to a geotechnical laboratory for sieving through a #80-mesh screen. The material passing the screen was to be submitted to a CLP laboratory for inorganic analysis. Section 4 contains details on the laboratories used for this field event.

3.3.2 FSPA 16 Alterations

Prior to initiating the field effort for FSPA 16, EPA reduced the number of samples to be collected at the Mullan Football Field. This reduction was documented for the field crew in a memorandum prepared on March 9, 2000 (Attachment A). The Mullan Football Field data were originally intended for use in a risk assessment, which dictated the magnitude of the sampling effort outlined in FSPA 13. However, the sampling effort under FSPA 16 did not require that level of detail. The FSPA 16 reduced effort provides sufficient data to determine if metal concentrations at the football field are sufficiently elevated to warrant remedial action.

Sampling at the site was reduced in half with an additional half of the remaining sample locations limited to surface soil only, for example the 38 locations at the Football Field were reduced to 19 locations with 10 locations limited to surface soil sampling (refer to Attachment A). The sample count for this site was reduced to 110 total samples: 48 samples from the Football Field, 21 samples from the Parking Lot, 31 samples from the Other Open Areas, and 10 field duplicates.

When the field crew arrived at the Mullan Football Field, it was discovered that the site description excerpted from FSPA 13 was not accurate. Specifically, a parking lot does not exist and the Other Open Areas were not present. Therefore, the site designations were revised to accurately describe the layout of the Mullan Football Field: Football Field, Picnic Area behind the Babe Ruth Field, and Little League Baseball Field. The samples scheduled to be collected at these newly named sites were revised as follows: 48 samples from the Football Field, 21 samples from the Picnic Area, 31 samples from the Little League Baseball Field, and 10 field duplicates.

New site numbers were assigned to the Mullan Football Field sites. The site numbers established in FSPA 13 were SD0010 (Football Field), SD0011 (Parking Lot), and SD0012 (Other Open Areas). To avoid confusion after the sites were renamed, the next numbers in the FSPA 13 series were assigned to the sites: SD0019 (Football Field), SD0020 (Picnic Area), and SD0021 (Little League Baseball Field).

A total of 102 soil samples (94 soil samples and 8 field duplicates) were collected from the three sites at the Mullan Football Field. This total included 46 samples from the Football Field, 20 samples from the Picnic Area, 28 samples from the Little League Baseball Field, and 8 field duplicates. These soil samples were sent to a lab for sieving and then submitted to a CLP laboratory for inorganic analysis on a 7 day turnaround schedule. Table 3-1 summarizes the samples collected at the Mullan Football Field.

Site SD0019 Football Field - Collection of samples below a depth of 6 inches was not possible at one location (104) due to excessive water below the ground surface. The material below 6 inches was a slurry that could not be retrieved from the excavation at discrete depths. Therefore, the samples below a depth of 6 inches were not collected from this location.

Site SD0020 Picnic Area - Collection of samples below a depth of 12 inches was not possible at one location (101) due to excessive water below the ground surface. The material below 12 inches was a slurry that could not be retrieved from the excavation at discrete depths. At this station, a duplicate was originally planned at the depth of 6 to 12 inches below ground surface. Neither the duplicate nor the deeper sample could be collected.

Site SD0021 Little League Baseball Field - Collection of samples below a depth of 12 inches was not possible at two locations (102 and 105). Rocks were encountered at a depth of 12 inches below ground surface at location 102, therefore the 12 to 18 inch sample was not collected. Excessive water was encountered at a depth of 12 inches below ground surface at location 105, therefore the 12 to 18 inch sample was not collected.

3.4 QUALITY CONTROL SAMPLES

A total of 1,471 soil samples were submitted for sieving and inorganic analysis. Over 10 percent of the soil samples submitted to the laboratory were field duplicates (153 samples). The CLP laboratories were assigned the responsibility for selecting a matrix spike/matrix spike duplicate (MS/MSD) sample for every 20 samples received.

A total of 34 drinking water samples were submitted for low concentration inorganic analysis. Over 10 percent of the drinking water samples submitted were field duplicates (4 samples). Two drinking water samples were designated as MS/MSD samples, which meets the five percent MS/MSD requirement.

FSPA 16 sampling efforts occurred from March 21 until March 31. During this period of time, one equipment rinsate was collected each day following decontamination of reused equipment. A total of 11 equipment rinsate samples were submitted for inorganic analysis.

Table 3-1
Sample Summary Table

Sample Location	Number of Environmental Samples	Number of Field Duplicates	Total Samples
SOIL SAMPLES			
Yard	1,200	125	1,325
Play Area	16	2	18
Garden	8	2	10
Driveway	39	5	44
Down spout	55	19	74
Mullan Football Field	94	8	102
WATER SAMPLES			
First draw water	15	2	17
Purged water	15	2	17
Equipment rinsates	11	NA	11
Totals	**1, 453**	**165**	**1,618**

Table 3-2
List of Samples Collected

Site Number	Yard Soil [a]	Play Area or Garden Soil [a]	Driveway Soil [b]	Downspout Soil [b]	Water [c]
201	5	-	-	-	-
202	5	-	1	2	-
203	4	1	-	2	-
204	5	-	1	2	-
205	8	-	1	2	-
206	5	-	1	-	-
207	5	-	-	2	2
208	4	1	1	2	-
209	5	-	1	-	-
210	5	-	1	-	2
211	Resident requested to be deleted				
212	5	-		-	2
213	5	-	1	-	-
214	4	1	-	2	-
215	5	-	-	-	-
216	5	-	1	-	-
217	5	-	1	2	-
218	Unable to confirm name/address of property owner				
219	Resident requested to be deleted				
220	5	-	1	2	-
221	5	-	1	2	2
222	5	-	-	2	-
223	5	-	1	2	2
224	5	-	1		-
225	5	-	1	2	-
226	5	-	1	2	-
227	5	-	1	2	2
228	5	-	1	2	-
229	5	-	-	-	-
230	5	-	1	2	-
231	5	-	1	-	-
232	5	-	1	2	-
233	5	-	1	-	2

Table 3-2 (Continued)
List of Samples Collected

Site Number	Yard Soil [a]	Play Area or Garden Soil [a]	Driveway Soil [b]	Downspout Soil [b]	Water [c]
234	Resident requested to be deleted				
235	5	-	-	-	-
236	Duplicate file for Site 221				
237	5	-	-	-	-
238	4	1	1	-	-
239	5	-	1	-	2
240	5	-	1	2	2
241	4	1	1	-	-
242	5	-	1	2	-
243	Unable to verify name/address of property owner				
244	11	-	-	-	-
245	-	-	-	-	2
246	5	-	1	-	-
247	5	-	1	2	-
248	7	-	-	1	-
249	5	-	1	-	-
250	5	-	1	2	-
251	5	-	-	-	-
252	5	-	-	-	-
253	-	-	-	-	2
254	-	-	-	-	2
255	5	-	1	-	-
256	5	-	-	-	-
257	5	-	1	-	-
258	-	-	-	-	2
259	5	-	1	2	-
260	5	-	1	-	-
261	5	-	1	2	-
262	Property not used for private residence				
263	5	-	1	-	-
264	5	-	1	2	-
265	5	-	1	-	-
266	5	-	-	2	2
267	5	-	-	2	-

Table 3-2 (Continued)
List of Samples Collected

Site Number	Yard Soil [a]	Play Area or Garden Soil [a]	Driveway Soil [b]	Downspout Soil [b]	Water [c]
268	-	-	-	-	2
Totals	**286**	**5**	**39**	**55**	**30**

[a] Yard, garden, and play area locations include samples collected from 4 to 5 discrete depths (refer to Section 3.1.1)
[b] Driveway and down spout soil locations are limited to surface soil samples (refer to Section 3.1.1)
[c] Water locations include first draw and purged water samples (refer to Section 3.2.1)

Notes:
Table does not include a summary of field duplicate samples
- Indicates sample not collected

4.0 SAMPLE MANAGEMENT

4.1 SOIL SAMPLES

The procedures outlined in FSPA 16 for sample handling and management were followed (refer to Section 5.6 of FSPA 16). Soil samples were collected in the field in quart size ziploc bags in order to provide sufficient sample volume to the geotechnical laboratory for processing through the #80 mesh sieve. Each soil sample was assigned two unique sample numbers: a six digit inorganic CLP sample number (e.g., MJ01AM) and an eight digit EPA regional tracking number (RTN) (e.g., 00124682). The field crew submitted the labeled quart ziploc sample under chain of custody (COC) to the geotechnical laboratory. They also submitted an empty pre-labeled 4-ounce glass jar, labeled EPA sample tag, and completed CLP COC to the geotechnical laboratory. After sample sieving, the geotechnical laboratory filled out the shipping information on the CLP COC and relinquished the samples to the CLP laboratory.

Two geotechnical laboratories were assigned:

- Soil Tech, 7865 NE Day Road West, Bainbridge Island, WA 98110, (206) 842-9877
- Hong West Associates Geosciences (HWA), 19730 64th Ave N. Suite 200, Lynnwood, WA 98036, (425) 774-0106

Two analytical laboratories were assigned:

- Sentinel Inc., 2800 Bob Wallace Avenue, Suite L3, Huntsville, AL 35805, (205) 534-9800
- Chemtech Consulting Group, 110 Route 4, Englewood, NJ 07631, (201) 567-6868

One additional laboratory was used by the U.S. Army Corps of Engineers for the sieving and analysis of the municipal park soil samples on a 2-day turnaround:

- American Analytical Services (AAS), 59148 Silver Valley Road, Osburn, ID 83849, (208) 762-1034

4.2 DRINKING WATER SAMPLES

Residential water samples were collected as specified in FSPA 16. Each sample was labeled with the appropriate EPA RTN and the samples were submitted to the laboratory with an EPA tag and COC.

Residential water samples were submitted to one laboratory:

- EPA Region 10 Laboratory (Manchester), 7411 Beach Drive East, Port Orchard, Washington 98366, (360) 871-0748

4.3 EQUIPMENT RINSATE SAMPLES

Equipment rinsate samples were collected as specified in FSPA 16 and at a minimum of one per day. Each sample was labeled with the appropriate CLP sample number and EPA RTN and the samples were submitted to the CLP laboratory with an EPA tag and CLP COC.

Equipment rinsate samples were submitted to one laboratory:

- Chemtech Consulting Group, 110 Route 4, Englewood, NJ 07631, (201) 567-6868

4.4 EPA PROCESSING INFORMATION

The EPA-assigned tracking information included the following:

- Project Code: TEC-618I
- Account Code: 00T1050102D102QLA00
- Case Number: 27886
- Site Spill ID: 2Q
- CERCLIS ID: IDD048340291

Table 4-1
Laboratory Summary Table

Analysis	Turnaround Time (days)	Analytical Method	Bottle Type (Preservative)	Laboratory
WATER SAMPLES				
Low concentration inorganics	35	ILCO 3.1	1 L HDPE (HNO_3)	Manchester
Inorganics	21	ILMO 4.0	1 L HDPE (HNO_3)	Chemtech
RESIDENTIAL SOIL SAMPLES				
Sieve #80 Mesh	10	ASTM D422	Quart Ziploc bag	HWA/Soil Tech
Inorganics	21	ILMO 4.0	4 oz WMGJ	Sentinel/Chemtech
MULLAN FOOTBALL FIELD SOIL SAMPLES				
Sieve #80 Mesh	7	ASTM D422	Quart Ziploc bag	HWA/Soil Tech
Inorganics	7	ILMO 4.0	4 oz WMGJ	Sentinel
MUNICIPAL PARK SOIL SAMPLES				
Sieve #80 Mesh	1	ASTM D422	Quart Ziploc bag	AAS
Inorganics	1	ILMO 4.0	4 oz WMGJ	AAS

Notes:
AAS - American Analytical Services
ASTM - American Society for Testing and Materials
HDPE - high density polyethylene
HNO_3 - nitric acid
HWA - Hong West & Associates
ILCO - Inorganic low concentration
ILMO - Inorganic multimedia-multi-concentration
Manchester - EPA Region 10 Laboratory
WMGJ - Wide mouth glass jar

5.0 PROJECT CONTACTS AND SCHEDULE

No changes were made to the project contacts identified in Section 8 of FSPA 16. The field effort was conducted from March 20, 2000, through April 1, 2000. EPA requested initiation of the project ahead of the schedule listed in FSPA 16.

6.0 REFERENCES

U.S. Environmental Protection Agency (EPA). 2000. *Final Field Sampling Plan for the Coeur d'Alene Basin-Wide RI/FS, Addendum No. 16 – Spring 2000 Call-in Residential and Mullan Football Field Sampling.* Prepared by URS Greiner, Inc., under Contract No. 68-W-98-228. February 14, 2000.

———. 1999. *Field Sampling Plan for the Bunker Hill/Coeur d'Alene Basin-Wide RI/FS, Addendum No. 13 –School Yard/Daycare Sampling to Support the Human Health Risk Assessment/Removal Assessments*. Prepared by URS Greiner, Inc., under Contract No. 68-W9-0054. July 14, 1999.

———. 1997a. *Generic Field Sampling Plan and Generic Quality Assurance Project Plan for the Bunker Hill Facility Project*. Prepared by URS Greiner, Inc., under Contract No. 68-W9-0054.

———. 1997b. *Health and Safety Plan for the Bunker Hill Facility Project*. Prepared by URS Greiner, Inc., under Contract No. 68-W9-0054.

ATTACHMENT A

Changes to FSPA 16 - Spring 2000 Call-In Residential and Mullan Football Field Sampling, Memorandum dated 03/09/00

URS GREINER MEMORANDUM

From: Kara Steward, URSG FSP 16 Task Lead

To: Field Crew
File

cc: Steven Hughes, URSG

Date: March 9, 2000

Re: Changes FSP 16 - Spring 2000 Call-In Residential and Mullan Football Field Sampling

In order to document revisions to the FSP 16 effort this memorandum contains a summary of the changes to the plan as of the date listed above. These changes are based on a more accurate list of call-in requests and a reduction in effort for the Mullan Football Field (MFF).

The total count for call-in residences as of March 1, 1999, totals 52 residences. An additional 10 contingency residences will be included in the proposed field effort. For each residence, a maximum of 24 soil samples will be collected (not including QA samples).

The current list of 62 residences includes a preliminary count of 11 homes that are on private water supplies and 24 residences for which the water supply has not been confirmed. A total of 34 residences will be assumed to require tap water sample collection. For each residence, two water samples will be collected (not including QA samples).

The original effort for the MFF consisted of 78 sample locations at the three areas (football field, parking lot, and other open areas) [described in FSP 13]. Originally the MFF data were to be included in the risk assessment for the basin (for FSP 13), this is no longer required. Therefore, the effort has been reduced under FSP 16 to half of the original total. These data will be sufficient to determine the need for remediation of the MFF. The total number of samples has been reduced from the original 347 to 110 samples, including QA samples. All of these samples will be submitted, following sieving, to the CLP laboratory for analysis on a 7-day turnaround time (TAT).

This memorandum contains revised versions of Tables 3-3 and 3-5 based on the changes briefly described above. A revised Table B-1 is included with this memorandum which contains the

revised sample locations and depths (replace Table B-1 in FSP 16) based on the reduction in scope.

The schedule for FSP 16 remains unchanged. The field effort will start on March 20, 2000 and continue for an anticipated 2 weeks. The field conditions include inclement weather (snow) which might slow the effort and require a third week. The schedule will include collecting all samples at the MFF on March 21 and 22. The MFF sampling effort will likely involve the participation of some students from the local high school (sophomore students from the Biochemistry and Television Technology classes). The participation of the students will include collection of split samples, observation of field activities, filming of field activities, and questions with the field personnel. One field crew member will be designated to coordinate all activities with the high school students.

Laboratories have not yet been determined for this project. Preliminary designations have been determined that all soil sieving will be submitted to a laboratory procured by URSG. All water and soil samples analyzed for inorganics will be submitted to a CLP laboratory. At this time, all low concentration water samples (residential drinking water) will be submitted to the EPA Region 10 Laboratory. Assigned EPA tracking numbers are presented below:

Project Code:	TEC-618 I
Account Code:	00T1050102D102QLA00
Site Spill ID:	2Q
RTN:	Week of 03/20/00 - 00124000 thru 00124999
	Week of 03/27/00 - 00134000 thru 00134999
	Week of 04/03/00 - 00144000 thru 00144999
Case Number:	***to be assigned when CLP laboratories are defined***
CLP numbers:	***to be assigned when CLP laboratories are defined***

Table 3-3
Environmental and Quality Control Sample Quantities

Analysis	Method	TAT (days)	Samples	Field Dups	MS/MSD	Total
Water Samples						
Inorganics, low conc.	ILCO3.1	35	68	7	4/4	83
Inorganics [equip. rinsates]	ILMO 4.0	21	25	-	-	25
Yard Soil Samples						
Sieve #80 Mesh	ASTM D422	-	1,488	149	-	1,637
Inorganics	ILMO 4.0	21	1,488	149	75/75	1,787
Mullan Football Field						
Sieve #80 Mesh	ASTM D422	-	100	10	-	110
Inorganics	ILMO 4.0	7	100	10	5/5	120

TAT - analytical turn around time (not applicable for sieve samples)
MS/MSD - matrix spike matrix spike duplicate (not required for equipment rinsate or sieve samples)

Table 3-5
Mullan Football Field Sampling Locations

Site	Site No.	Soil Sample Depths (inches bgs)					Total
		0-1	1-6	6-12	12-18	18-24	
Football Field	SD0010	19	9	9	9	2	48
Parking Lot	SD0011	9	4	4	4	0	21
Other Open Areas	SD0012	12	6	6	6	1	31
Field Duplicates		4	2	2	2	0	10
Total		**44**	**21**	**21**	**21**	**3**	**110**

All Mullan Football Field samples will be submitted for 7 day turn around time analysis for inorganics

Table B-1
Summary Table for Mullan Football Field Samples

Site	Name	Location	Sample Depth		Matrix	Type	Location Type	Gradient Relationship
			Beginning	Ending				
SD0019	Mullan Football Field	101 -1	0	0.08	SS	ES	GS	N
		101 -2	0.08	0.5	SB	ES	BH	N
		101 -3	0.5	1	SB	ES	BH	N
		101 -4	1	1.5	SB	ES	BH	N
		102 -1	0	0.08	SS	ES	GS	N
		102 -2	0.08	0.5	SB	ES	BH	N
		102 -3	0.5	1	SB	ES	BH	N
		102 -4	1	1.5	SB	ES	BH	N
		103 -1	0	0.08	SS	ES	GS	N
		103 -2	0.08	0.5	SB	ES	BH	N
		103 -2	0.08	0.5	SB	**FD**	BH	N
		103 -3	0.5	1	SB	ES	BH	N
		103 -4	1	1.5	SB	ES	BH	N
		104 -1	0	0.08	SS	ES	GS	N
		104 -2	0.08	0.5	SB	ES	BH	N
		104 -3	0.5	1	SB	ES	BH	N
		104 -4	1	1.5	SB	ES	BH	N
		104 -5	1.5	2	SB	ES	BH	N
		105 -1	0	0.08	SS	ES	GS	N
		105 -2	0.08	0.5	SB	ES	BH	N
		105 -3	0.5	1	SB	ES	BH	N
		105 -3	0.5	1	SB	**FD**	BH	N
		105 -4	1	1.5	SB	ES	BH	N
		106 -1	0	0.08	SS	ES	GS	N
		106 -2	0.08	0.5	SB	ES	BH	N
		106 -3	0.5	1	SB	ES	BH	N
		106 -4	1	1.5	SB	ES	BH	N
		107 -1	0	0.08	SS	ES	GS	N
		107 -2	0.08	0.5	SB	ES	BH	N
		107 -3	0.5	1	SB	ES	BH	N
		107 -4	1	1.5	SB	ES	BH	N
		107 -4	1	1.5	SB	**FD**	BH	N
		108 -1	0	0.08	SS	ES	GS	N
		108 -2	0.08	0.5	SB	ES	BH	N

Table B-1 (Continued)
Summary Table for Mullan Football Field Samples

Site	Name	Location	Sample Depth		Matrix	Type	Location Type	Gradient Relationship
			Beginning	Ending				
SD0019	Mullan Football Field (cont.)	108 -3	0.5	1	SB	ES	BH	N
		108 -4	1	1.5	SB	ES	BH	N
		108 -5	1.5	2	SB	ES	BH	N
		109 -1	0	0.08	SS	ES	GS	N
		109 -2	0.08	0.5	SB	ES	BH	N
		109 -3	0.5	1	SB	ES	BH	N
		109 -4	1	1.5	SB	ES	BH	N
		110 -1	0	0.08	SS	ES	GS	N
		111 -1	0	0.08	SS	ES	GS	N
		111 -1	0	0.08	SS	**FD**	GS	N
		112 -1	0	0.08	SS	ES	GS	N
		113 -1	0	0.08	SS	ES	GS	N
		114 -1	0	0.08	SS	ES	GS	N
		115 -1	0	0.08	SS	ES	GS	N
		116 -1	0	0.08	SS	ES	GS	N
		117 -1	0	0.08	SS	ES	GS	N
		118 -1	0	0.08	SS	ES	GS	N
		119 -1	0	0.08	SS	ES	GS	N
SD0020	Mullan Parking Lot	101 -1	0	0.08	SS	ES	GS	N
		101 -2	0.08	0.5	SB	ES	BH	N
		101 -3	0.5	1	SB	ES	BH	N
		101 -3	0.5	1	SB	**FD**	BH	N
		101 -4	1	1.5	SB	ES	BH	N
		102 -1	0	0.08	SS	ES	GS	N
		102 -2	0.08	0.5	SB	ES	BH	N
		102 -3	0.5	1	SB	ES	BH	N
		102 -4	1	1.5	SB	ES	BH	N
		103 -1	0	0.08	SS	ES	GS	N
		103 -2	0.08	0.5	SB	ES	BH	N
		103 -3	0.5	1	SB	ES	BH	N
		103 -4	1	1.5	SB	ES	BH	N
		104 -1	0	0.08	SS	ES	GS	N
		104 -1	0	0.08	SS	**FD**	GS	N
		104 -2	0.08	0.5	SB	ES	BH	N

Table B-1 (Continued)
Summary Table for Mullan Football Field Samples

Site	Name	Location	Sample Depth		Matrix	Type	Location Type	Gradient Relationship
			Beginning	Ending				
SD0020	Mullan Parking Lot (cont.)	104 -3	0.5	1	SB	ES	BH	N
		104 -4	1	1.5	SB	ES	BH	N
		105 -1	0	0.08	SS	ES	GS	N
		106 -1	0	0.08	SS	ES	GS	N
		107 -1	0	0.08	SS	ES	GS	N
		108 -1	0	0.08	SS	ES	GS	N
		109 -1	0	0.08	SS	ES	GS	N
SD0021	Mullan Other Open Areas	101 -1	0	0.08	SS	ES	GS	N
		101 -2	0.08	0.5	SB	ES	BH	N
		101 -3	0.5	1	SB	ES	BH	N
		101 -4	1	1.5	SB	ES	BH	N
		102 -1	0	0.08	SS	ES	GS	N
		102 -2	0.08	0.5	SB	ES	BH	N
		102 -3	0.5	1	SB	ES	BH	N
		102 -4	1	1.5	SB	ES	BH	N
		103 -1	0	0.08	SS	ES	GS	N
		103 -2	0.08	0.5	SB	ES	BH	N
		103 -2	0.08	0.5	SB	**FD**	BH	N
		103 -3	0.5	1	SB	ES	BH	N
		103 -4	1	1.5	SB	ES	BH	N
		104 -1	0	0.08	SS	ES	GS	N
		104 -2	0.08	0.5	SB	ES	BH	N
		104 -3	0.5	1	SB	ES	BH	N
		104 -4	1	1.5	SB	ES	BH	N
		105 -1	0	0.08	SS	ES	GS	N
		105 -2	0.08	0.5	SB	ES	BH	N
		105 -3	0.5	1	SB	ES	BH	N
		105 -4	1	1.5	SB	ES	BH	N
		105 -4	1	1.5	SB	**FD**	BH	N
		106 -1	0	0.08	SS	ES	GS	N
		106 -2	0.08	0.5	SB	ES	BH	N
		106 -3	0.5	1	SB	ES	BH	N
		106 -4	1	1.5	SB	ES	BH	N
		107 -1	0	0.08	SS	ES	GS	N

Table B-1 (Continued)
Summary Table for Mullan Football Field Samples

Site	Name	Location	Sample Depth		Matrix	Type	Location Type	Gradient Relationship
			Beginning	Ending				
SD0021	Mullan Other Open Areas (cont.)	108 -1	0	0.08	SS	ES	GS	N
		109 -1	0	0.08	SS	ES	GS	N
		109 -1	0	0.08	SS	**FD**	GS	N
		110 -1	0	0.08	SS	ES	GS	N
		111 -1	0	0.08	SS	ES	GS	N
		112 -1	0	0.08	SS	ES	GS	N

Notes:
BH - borehole
ES - environmental sample
FD - field duplicate
GS - ground surface
N - not determined
SB - subsurface soil
SS - surface soil

All samples will be submitted to a laboratory for #80 mesh sieving followed by inorganic analysis.

ATTACHMENT B

Briefing Sheet - Residential Sampling
Coeur d'Alene River Basin,
March 20 - April 7, 2000